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AUGUST

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EDITORIALS
Memphis Meeting
Mottled Enamel

DENTAL HEALTH EDUCATION
Endocrine Glands—*Hogeboom*

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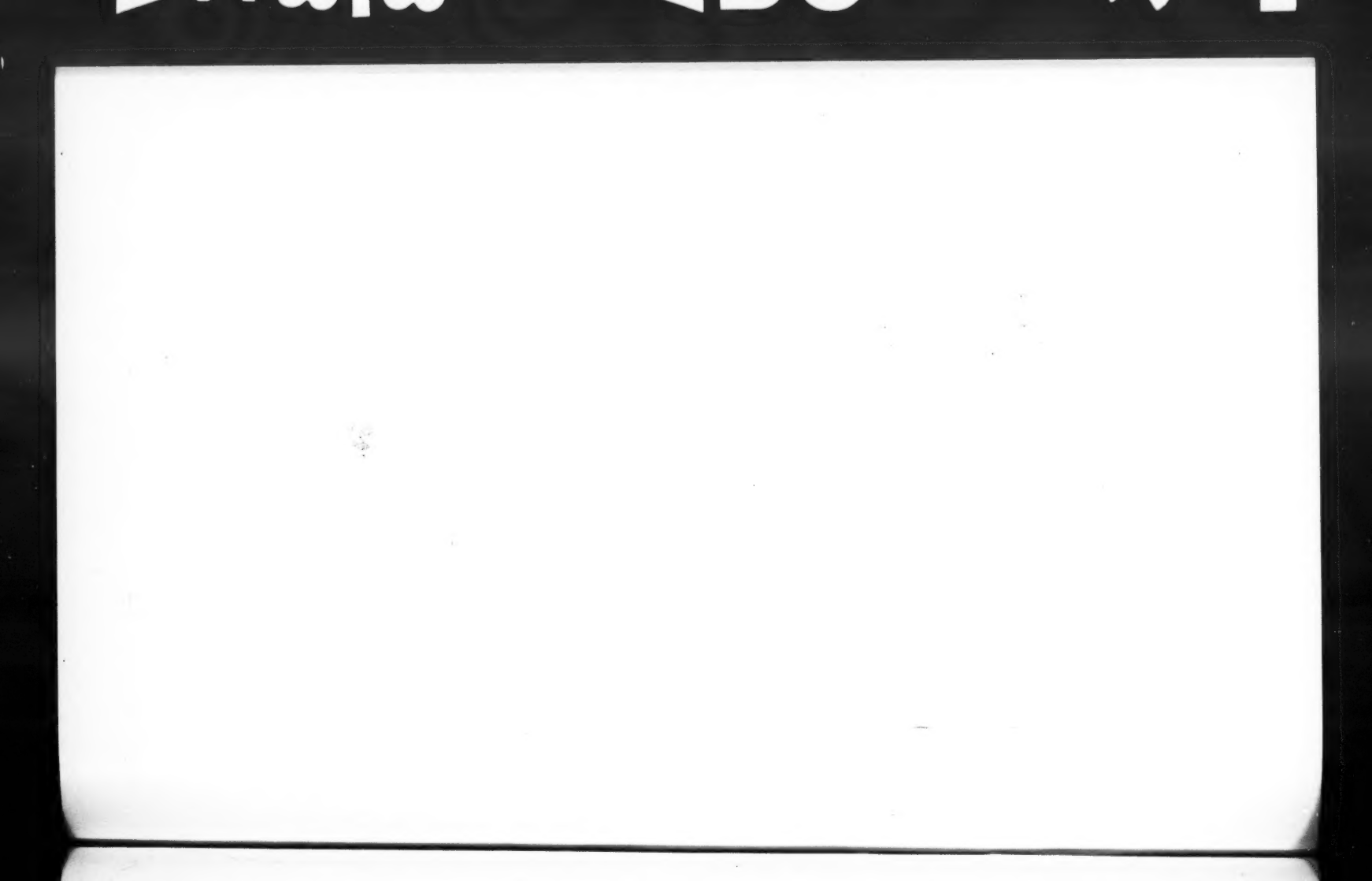

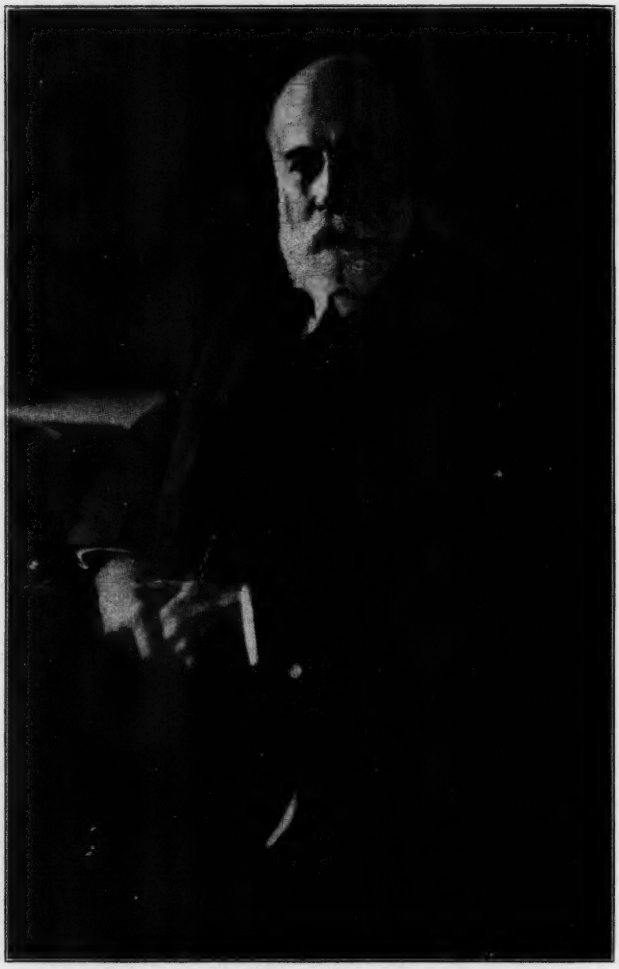

HENRY WEBSTER GILLETT, D.M.D., New York City
Recipient of the William Jarvie Fellowship Medal, 1931

THE JOURNAL
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Original Communications

A STUDY IN FULL DENTURE CONSTRUCTION*

By the PASADENA PROSTHETIC STUDY CLUB†

ANATOMY

AS an introduction to the technic which we follow, we feel that a review of the salient points in the actual anatomic structures associated with denture construction will serve to better prepare our minds for the points to be called to attention later.

The Maxilla.—This bone is composed of a body and four processes: zygomatic, frontal, alveolar and palatine.

1. Stress bearing area: We note that the alveolar processes alone will be the stress bearing area. It is the thickest and most spongy part of these bones.

2. Nonstress bearing area, or relief areas: These will consist of the following:

(*a*) The torus palatinus, that prominent bony area often found in the center of the palate, which is covered by thin nonresilient tissue. In these specimens, we note the thin plates of the palatine processes of the superior maxillae forming the anterior three fourths of the hard palate and the horizontal plates of the palatine bones forming the distal one fourth of the hard palate.

(*b*) The incisive foramen, in which are the openings for the foramina of Scarpa and the incisive canals. There are sharp spines in some skulls to protect the terminals of the descending palatine artery and nasopalatine nerves.

(*c*) The greater and lesser, or posterior palatine, foramina. There are bony spines along the lateral phases of the hard palate. It is important to palpate for these in this palatine groove.

3. Postdam areas of the upper jaw: These are:

(*a*) The pterygomaxillary notch, formed by the distal portion of the tuberosity and the pterygoid hamulus. This notch is very important and a definite

*Read before the Section on Full Denture Prosthesis at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 24, 1930.

†Wilfred H. Terrell, D.D.S., Director.

Diagnosis and Record Chart

by

PASADENA PROSTHETIC STUDY CLUB

Patient ..... Date .....

Address ..... Phone .....

Recommended by .....

Radiographs ..... Study Models .....

TOOTH SELECTION

Color of ..... { Eyes / Hair / Complexion / Teeth }

Physical Size of Arches ..... { 1. Large / 2. Medium / 3. Small } { U / L }

Face Form ..... { 1. Square / 2. Tapering / 3. Ovoid }

Arch Form ..... { 1. Square / 2. Tapering / 3. Ovoid } { U / L }

Shade of Teeth Selected ..... { No. ..... }

Mould of Teeth Selected ..... { Anteriors No. / Posteriors No. }

HEALTH AND SURGERY

General Health ... { Robust / Average / Frail }

Age ..... { Young / Middle Aged / Old }

Teeth to be Extracted ... R 8 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7 8 L / 8 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7 8

Date of Last Extractions ..... { U. ..... / L. ..... }

Surgery Necessary ..... { U. ..... / L. ..... }

DENTURE HISTORY

Kind of Former Dentures ..... { U. ..... / L. ..... }

Years and Kind of Service ..... { U. ..... / L. ..... }

Deficiencies of Dentures ..... { U. ..... / L. ..... }

DISCUSSION AND AGREEMENT

Fig. 1.—Diagnosis and record chart.

place for postdamming distally to the tuberosity.

(*b*) The central area at the junction of the hard and soft palates, formed by the projecting processes of the two horizontal plates of the palate bones known as the posterior nasal spine. There is a projection distally where the movable soft palate begins and to which the musculus uvula is attached.

(*c*) Areas lying laterally on either side of this posterior nasal spine and medially to the notches, formed by the concave distal borders of the horizontal plates of the palate bones to which the soft palate is attached. The posterior palatine groove is a square, angular depression, medially to the tuberosities where the postdamming is brought forward but avoiding pressure on the bony spines around the posterior palatine foramina. These form the five postdam areas which will be outlined in the impression technic.

4. Areas connected with the external seal of the upper jaw; bony landmarks. These are:

(*a*) The incisive fossae, which give rise to the depressor alae nasi and the nasalis muscles, and, on their alveolar border, to a slip of the obicularis oris. These lie on either side of the anterior nasal spine, giving rise to the frenum labium.

(*b*) Laterally from these the canine eminence, covering the root of the cuspid.

(*c*) The canine fossa, distolaterally, giving rise to the caninus muscle. This lies over the roots of the bicuspids.

(*d*) The key ridge. As the fossa extends distally, it expands outward into what is known as the key ridge, which covers the roots of the first molar and forms a definite landmark anteroposteriorly for the position of the first molar on the artificial, as well as the natural, denture. The buccinator muscle begins its upper attachment here and extends distally above the crest of the alveolar process and along the buccal space beside the tuberosity, where the mucus fold fuses into the notch.

The Mandible.—The mandible is the largest and strongest bone of the face and is composed of a body and two rami.

1. Stress bearing areas: There are two:

(*a*) The lateral phases of the alveolar process as a saddle.

(*b*) The area lying across and mesiolaterally from the retromolar triangle and on the external oblique ridge reaching to the attachment of the buccinator muscle, which extends about as far forward as the second lower bicuspids. This area is often lost sight of, especially in some mandibles, in planning the buccal extension onto the external oblique ridge for the stress bearing area of the four posterior teeth.

2. Nonstress bearing areas. These are:

(*a*) The crest of the ridge, as is demonstrated in the lower impression technic.

(*b*) The mental foramen, in cases of extreme absorption.

(*c*) The internal oblique or mylohyoid ridge to which the mylohyoideus muscle is attached.

(*d*) The lingual prominences near the crest of the ridge and lateral from the median line in some specimens.

3. Postdam areas of the lower jaw:

(*a*) We will consider the area known as the lateral throat form, which lies just distally to the distal end of the mylohyoid ridge and retromolar triangle. It is possible to get a definite seal on the lower denture in this area, which is analogous to postdamming on the soft palate of the upper. This area is formed by mucous tissue covering the muscles forming the floor of the mouth and the

CLASSIFICATION CHART

Mental Classification
1. Philosophical
2. Exacting
3. Hysterical
4. Indifferent

Muscular Tone and Development
1. No Degenerative Changes
2. Normal Functions Preserved by Dentures
3. Subnormal Conditions

Physical Form of Alveolar Ridges
1. Favorable
2. Minor Difficulties
3. Surgery Needed

U. _____ L.

Soft Tissues
1. Normal Density
2. Thin Membrane
3. Double Thickness
4. Surgery Indicated

U. _____ L.

Border Tissues
1. Attached
2. Areolar (Placeable)

H. High, M. Medium, L. Low

U. _____ L.

Muscle and Frenum Attachments
1. High
2. Medium
3. Low

U. _____ L.

Ridge Relation
1. Normal
2. End to End
3. Protrusive
4. Retrusive

Throat Form
1. Class I
2. Class II
3. Class III

U L

Vault Form
1. Square
2. Tapering
3. Arched
4. Flat

Tongue Form
1. Wide
2. Medium
3. Narrow

Resorption of Tissue
1. Normal
2. Incomplete
3. Excessive

Muscles of Mastication
1. Heavy
2. Medium
3. Light

Health of Mucosa
1. Healthy
2. Irritated
3. Pathological

Saliva
1. Natural
2. Insufficient
3. Excessive

a. Serous
b Mucous

Fig. 2.—Classification chart.

lateral area of the throat. Coming from the soft palate downward, we find the palatoglossus muscle passing through the anterior pillar of the fauces and inserting itself into the side and root of the tongue. Extending through the anterior portion of the lateral throat form, we have the pterygomandibular ligament, which originates from the hamular process above and inserts itself in the surface of the ramus just in front of the lingula and distally to the retromolar triangle. Inserting itself into the distal border of this ligament is the superior constrictor of the pharynx, and into the anterior border extend the distal fibers of the buccinator muscle, which pass across the anterior border of the ramus. Extending forward from the lateral throat form are the mylohyoid group of muscles, which form the floor of the mouth and act in perfect coordination with these muscles as the tongue moves forward.

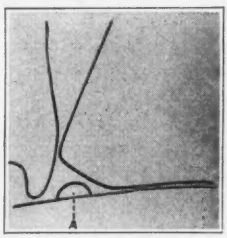

Fig. 3.—Pterygomaxillary notch located between the maxillary tuberosity and the pterygoid hamulus. *A*, location of the postdam as related to these structures.

(*b*) Lying over the retromolar triangle is a soft pad of tissue, which is compressible, and which serves to carry the seal over the ridge to the buccal fold of tissue, continuing along the external oblique ridge where the buccinator muscle is attached.

4. Lingual seal area. (*a*) From the lateral portion of the throat, or pretonsillar fossa, we follow downward and forward along the mylohyoid ridge to the second bicuspid region, which is the lowest point of muscle attachment in the floor of the mouth, passing upward and forward above the sublingual glands to the lingual frenum.

As students of denture construction, we find that we have not only to consider the above-mentioned structures as related to mastication, but must also consider the other anatomic structures within their functional range, as those brought into play during the acts of laughing, sneezing, coughing, talking, etc., i.e., the levator palati, orbicularis oris, tensor palati, labial and lingual frenum and others having a part in producing a balanced tissue tension.

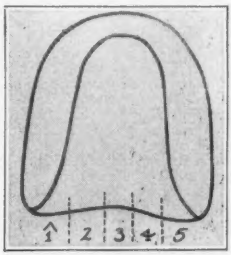

Fig. 4.—Five postdam areas.

EXAMINATION AND DIAGNOSIS

We cannot stress too emphatically the importance of roentgenograms and study models previous to diagnosis of the mouth proper. The advantage of a chart (Figs. 1-2) can readily be seen as all the necessary points for consideration are outlined and can be taken up in a certain definite routine, eliminating the common errors in diagnosis. Then too, the chart

becomes a permanent record and can be attached to cards in the various files.

The chart, as you see, starts, the same as the record cards, with the patient's name, etc. Then comes tooth selection, necessitating a careful study of the patient and especially facial characteristics. We attempted to work out a rule governing the color selection for different types of individuals but this work as yet has not been completed. We did notice, in all patients examined who had blonde hair and light eyes that the shade was always light.

The next headings, health, surgery and previous denture history, need little discussion. We will all agree that, as a general thing, if we could remake the case in hand, most of us would change a little point here or there. If the patient has worn dentures, it is important to get as complete a history as possible and profit by previous mistakes.

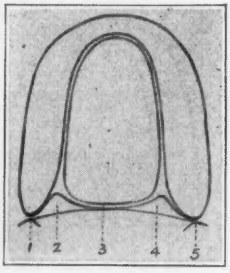

Fig. 5.—Comparative widths of postdam in different areas.

Mental classification is of prognostic value. In the physical form of the ridges, we often find large tuberosities, and if these were not noted and taken care of by surgery, the patient would be unable to wear the denture.

It is ideal for the soft tissues and mucosa of the ridges in general to be firm and resilient in character, as thus a cushion is provided on which the denture may be seated. When the tissues are hard, tense and thin, the bony underlying ridge should be thoroughly examined by roentgen ray, as this type, if the ridge is serrated, or if there are loose particles of bone, will make it impossible for the patient to exert even the slightest pressure. Surgery is indicated in these cases.

Border tissues, muscle and frenum attachments should be carefully studied, as attachment near the crest of the ridge may be detrimental to the retention of the denture during function and should be properly compensated. A low, broad frenum often should be operated on.

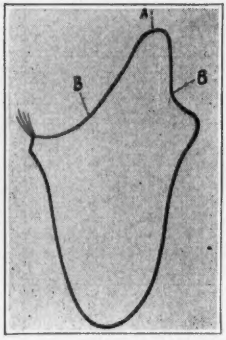

Fig. 6.—Cross-section through mandible, showing the external and internal oblique ridges. *A*, crest of ridge which is non-stress-bearing; *B* and *C*, stress-bearing areas of mandible.

Ridge relation and vault form need little explanation. A high vault case is generally more secure against lateral stress. The throat forms in both upper and lower dentures are explained in the charts, Figures 10 and 12.

To return to the diagnostic chart: The tongue is of importance, and most of us have had sad experiences due to failure

to allow for the tongue of the patient who has long been edentulous.

Of course, it is evident that the mucosa should always be healthy and properly served with nerve and blood supply. An anemic tissue fails to adapt itself to the denture.

The last point, and by no means the least, is the saliva. Certain types of saliva seem to be an aid in retaining the denture, while others are a considerable detriment. An insufficiency of saliva is the source of other difficulties.

We trust that the few points brought to your attention have emphasized the importance of a thorough mouth examination previous to denture making. As far as we know, this method furnishes the best means of avoiding misunderstandings and increases cooperation, as you have informed the patient of all the difficulties to be encountered.

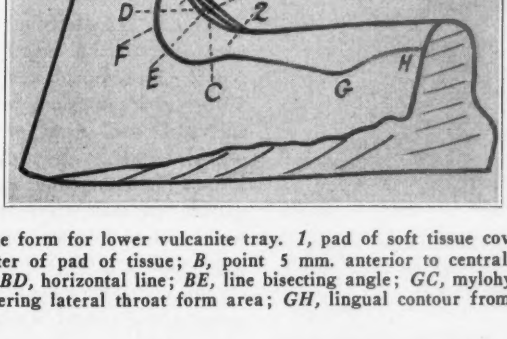

Fig. 7.—Outline form for lower vulcanite tray. *1,* pad of soft tissue covering retromolar triangle; *3,* center of pad of tissue; *B,* point 5 mm. anterior to central point; *BC,* perpendicular line; *BD,* horizontal line; *BE,* line bisecting angle; *GC,* mylohyoid ridge; *CFA,* arc of circle covering lateral throat form area; *GH,* lingual contour from second bicuspid region forward.

THE UPPER IMPRESSION

An aluminum tray sufficiently large to allow for one-quarter inch thickness of compound at all points of impression was selected, and the distal edge of the tray was flattened downward so as to assure one-quarter inch thickness of compound over the pterygomaxillary notches, as in Figure 3.

We now heated sufficient black tray compound to fill the tray and give an excess. Having it fairly stiff and shaped in the tray to the approximate form of the arch, we carried it to the mouth, exerting enough pressure to insure equal distribution of the compound over the entire area of the arch. We now chilled and removed it. With a mouth blowpipe, we heated the entire tissue surface of the compound to a depth of 1 mm., tempered in water at 115 F., and returned to the mouth, exerting 20 pounds pressure upward and backward for the purpose of compressing the underlying tissues. We now chilled and removed it.

The compound impression thus obtained was now removed from the metal tray and was used as a tray itself from this point on. It is for this reason that we used the black tray compound, as it is hard enough to retain its shape at mouth temperature and in the handling. Having the compound impression removed

from the metal tray, we trimmed away the excess material along the buccal and labial margins and also trimmed the posterior border, allowing the compound to extend one-eighth inch distally to the pterygomaxillary notches, as in Figure 12.

We now formed the peripheral roll, and muscle trimmed in the following manner. With the flame of the mouth blowpipe directed toward the trimmed margin of compound, we heated it slightly from the tuberosity area on the left side to the cuspid area on the same side, tempered it in hot water and carried it to the mouth. Holding the impression under 20 pounds pressure, we

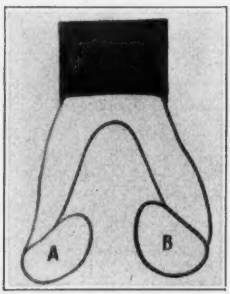

Fig. 8.—Cross-section through impression tray with compound block on it. *A* and *B*, compound traced on borders.

manipulated the cheek forcibly forward and backward two or three times, and chilled and removed the impression. With a sharp knife, we now trimmed away the excess compound, which was rolled over by the manipulation of the cheek. We repeated this procedure on the same area until no excess compound showed. The opposite side was handled in the same manner.

The labial area from cuspid to cuspid was now heated with a mouth blowpipe, care being observed not to heat to the point of collapsibility; tempered in hot water, and carried to the mouth. Holding the impression again under 20 pounds pressure, we manipulated the lips forcibly toward the medium line, then placed the index finger over the edge of the lip and pressed downward and inward to secure close adaptation of compound to the labial tissues of the ridge. We then chilled and removed the compound, again trimmed away any excess, and repeated the procedure until the labial fold of tissue was at the rest position. We now examined the mouth and noted the width of the nonstress bearing areas and trimmed the corresponding areas out on the impression, including the entire distal edge and to the distal aspect of the tuberosities, as in Figure 4. This area we trimmed to the depth of from one-sixteenth to one-eighth inch.

We now prepared the plaster wash by using two and one-half "Kerr" cups of No. 2 impression plaster to 3 ounces of 30 per cent potassium sulphate solution and spatulated until all lumps disappeared. This gives a thin milky mix. Using the compound impression as a spatula, we now stirred the plaster mix until enough plaster remained on the compound to give us the results desired. At this point, we quickly carried the impression and plaster wash to the mouth and held it under 20 pounds pressure upward and backward toward the lobe of the ear until the plaster had set. The plaster wash in this case was used for the purpose of placing the stress bearing areas under pressure and to allow a relaxed condition of the nonstress bearing areas, which were previously trimmed out in the compound impression. We now removed the impression from the mouth and, with an indelible pencil, marked in the mouth the anterior edge of the moving palate at the median line and the

distal edge of the hard area at the median line, and outlined the entire hard area, including the anterior palatine foramen. We next marked the pterygomaxillary notches on both sides, connecting the latter marks with a line passing just anteriorly from the edge of the moving palate. We now located the areas of compressibility medially to the tuberosities and outlined them as in Figures 3 and 5. The impression was then reinserted in the mouth for the purpose of transferring the mouth markings to the impression. On removal of the impression, if the markings are not distinct on the plaster wash, we retrace these markings with an indelible pencil on the impression. We then scraped the nonstress bearing area, as outlined in the palatal portion of impression, sufficiently to allow for future settling of the finished denture (Fig. 5). We retraced the postdam area markings with a sharp pointed instrument sufficiently deep to register on the cast, as an embossed line. The impression was then boxed in such a manner as to retain the peripheral roll of the impression, as we wished to duplicate this roll in our finished denture. We poured the cast in No. 4 plaster and allowed it to become sufficiently hard for separation. The postdam markings may be now seen on the cast, as an embossed line. With a No. 10 bur, this embossed line was bisected, cutting a groove to approximately two-thirds the depth of tissue compressibility in the various areas, as outlined in Figures 3 and 5.

The baseplate was adapted to the cast and the wax rim attached, then taken to the mouth and tested for compressibility over postdam areas. If insufficient compressibility of tissues is noted by escaping air bubbles, we deepen the groove on the cast in that particular area and readapt the baseplate. We repeated this procedure until sufficient compressibility of tissue was obtained to assure us of a suitable postdam.

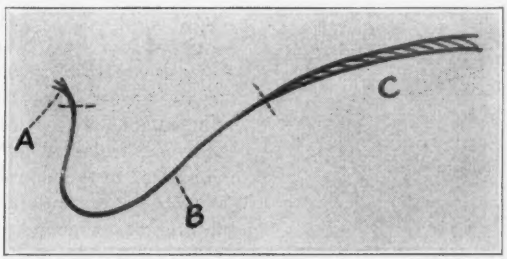

Fig. 9.—Cross-section through palate. *A*, mucous fold; *B*, stress-bearing area; *C*, nonstress-bearing area of vault.

THE LOWER IMPRESSION

In taking the lower impression, we use an individual vulcanite tray that has been constructed for the case according to the anatomic landmarks of the mouth, taking care that it covers all areas that should be covered by the finished denture.

Technic.—First to be considered are steps in construction of the vulcanite tray. An aluminum tray is selected, and sufficient compound to envelop the tissues is allowed in excess of the area to be covered by the denture. This allows us to locate the bony landmarks. (Fig. 6.) Lingual flanges of the tray are cut

on the heel at an angle of 45 degrees. This is done in order not to cover the lateral throat form area.

An impression tray compound is used that chills more quickly and is more brittle. The compound should be worked quite stiff and the surface glazed and tempered before seating. When the impression is removed and chilled, the lingual flange is trimmed flush with the angle of the tray.

A piece of soft compound, the size of a large olive and the consistency of putty, is seared to one of the lingual flanges at the heel. The impression is then replaced in the mouth under pressure

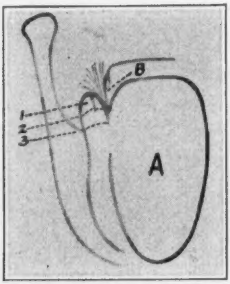

Fig. 10.—Throat form classification. *A*, tongue; *B*, lateral throat form area.

and, with the index finger, lateral pressure is exerted on the compound, which is forced laterally into the pretonsillar fossa, but not downward, and chilled and removed. A groove is then cut on the lingual surface, which enables this piece to be snapped off. The same procedure is followed on the opposite side, except that the extension is left intact. The broken flange is replaced and attached with sticky wax and the impression is boxed and poured in model plaster.

After the cast has been obtained, care should be taken in outlining the case for the vulcanite tray, as illustrated in Figure 7.

To avoid having to grind out the inner portion of vulcanite tray to allow room for compound, when securing the final impression, we burnish a 24-gage Ash tray metal over the area outlined on the cast, with the exception of the throat form. Over this metal, two thicknesses of baseplate wax is added and three thicknesses of wax in the flange area, which makes all a uniform thickness. Then the tray is vulcanized, and is tried in the mouth. Margins and throat form flanges are tested for overextension, and margins in excess are relieved.

As the second step is the taking of the final impression, the tray metal is then removed and No. 1 red stick compound is traced along the borders of the tray, but not over the crest of the ridge nor on the throat form flanges. (Fig. 8.) The compound is glazed with a mouth blowpipe, tempered in water at 115 F. and seated in the mouth with evenly distributed finger pressure on the ridge, permitting the compound to flow toward the crest of the ridge, relieving the crest of stress and producing a saddle effect on the sides. The excess of compound is trimmed on the margins, and then the lingual border is glazed and the impression reseated in the mouth, the lingual margin muscle trimmed and the compound then chilled. The same procedure of muscle trimming is followed on the buccal and labial borders.

We then build up a compound bite-block on the occlusal surface of the tray, and while the compound is still moldable after insertion of the upper wax rim, the patient is asked to close to establish equalized pressure on the lower impression. The impression is then chilled and tested to see that equal pressure is obtained on the tissues.

The surface of the impressions is glazed lightly and the patient asked to close, with the rims under biting stress to equalize the tissue tension. Compound is then traced on one throat form flange and the impression seated under finger pressure, the patient being instructed to protrude the tongue. This procedure is repeated until no excess compound is displaced by protruding the tongue. The same process is repeated on the opposite side.

It is now tested for peripheral seal, and if this has not been secured, all but the throat form flanges are slightly glazed and tempered in warm water and reseated under biting stress and the patient is instructed to swallow. If the muscle trimming has been accurate to this point in the impression technic, a perfect seal will be established. This seal, together with the mechanical retention which is obtained in the pretonsillar area in most cases, will give the denture a stability equal to that of the upper.

Most of the difficulties encountered in full denture construction are found in the lower denture. In the past, the lower denture that would function on a par with the upper denture has been the ideal toward which we have worked, but which has seldom been realized.

A comparative study of the maxillary arch and the mandibular arch will seemingly show conditions far more favorable in the upper than in the lower, but a detailed study of the possibilities of the lower will show, in a great many cases, conditions just as favorable for stability and for endurance to stresses of mastication as in the upper.

In making this statement, we do not lose sight of the fact that there are cases, usually due to pathologic conditions, which will always be at a marked disadvantage.

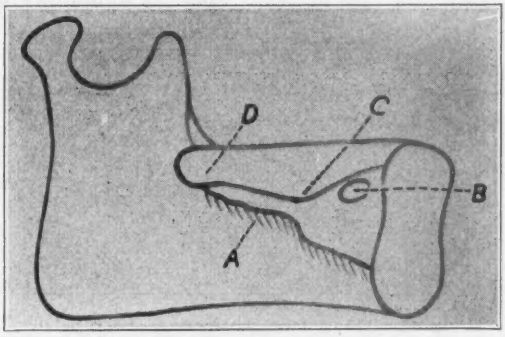

Fig. 11.—Mandible, showing outline of denture.

The technic which is used is based upon a knowledge of the anatomic structures available for use in bearing stresses and securing stability of the denture, and success with this technic is within the reach of any man sufficiently interested in his work to be exacting in his study of the mouth conditions.

We cannot stress too greatly the importance of attention to detail in all steps of any technic, if satisfactory results are to be obtained.

TECHNIC FOR RELATIONSHIP

This technic employs an intra-oral method securing a functional tracing which records all movements of the mandible, protrusive, lateral, centric and intermediate ranges. By the time the patient has completed the tracing, he has developed a record of the functional centric relation, which may or may not coincide with the tracing as started, going to all extreme positions, tracings made by means of three steel tracing studs, one being mounted in the incisor region and one in each of the first molar areas. These are mounted in the upper wax rim.

Before securing the relationship, it is important that the finished bases be completed so that the tissues may be subjected to the same stresses that they must sustain when the dentures are completed. If it is a gold case, the gold bases should be completed and tested for peripheral seal and endurance to stresses of mastication in the different directions.

If it is to be a vulcanite or condensite case, the base should be completed in vulcanite, and the finished case will follow a double vulcanization method or its equivalent; that is, the discarding of the base at the time of flasking, all new material being used.

If the bases are not satisfactory at this point, it is useless to go ahead with the construction of the dentures, as nothing more can be expected from the finished dentures than is to be found in these bases, and it is far better to repeat the work from the beginning.

The bases proving satisfactory, wax rims are attached. These should be made of homogeneous wax instead of folded baseplate wax, as the mandibular movements will dislodge the tracing studs at the time the tracing is made. These wax rims are then formed with angular or flat surfaces, as it is easier for the eye to measure distances on flat planes than on a curved surface.

The rims, having been attached to the bases and formed in excess as to contour and length, are placed in the patient's mouth; the high and low lip lines are marked, and the plane of occlusion is determined. By means of a hot-plate, the wax is melted down to the line which has been marked on the wax in the mouth. When the proper opening for the case has been established by this means, we are ready to transfer the bases from the mouth to the instrument.

The amount of opening required for the case should be carefully studied at this point, as the instrument will be set and this relation carried through to the finished dentures. It is always better to err on the side of having too much open-

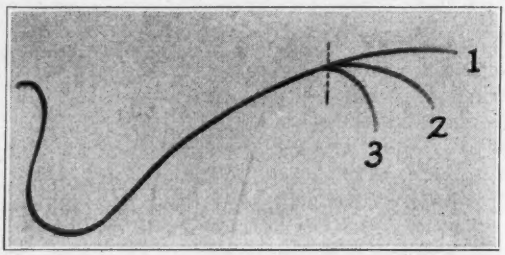

Fig. 12.—Throat form classification of soft palate.

ing than to have too little. As we all know, settling in some mouths is very rapid, and it occurs in practically every full denture case. Esthetics, facial expression and the patient's entire appearance, are affected by this one point alone.

An instrument for the purpose is used to pool the wax in the posterior part of the lower rim in the molar and bicuspid regions, care being observed not to soften the edges of the wax and allow the softened wax to flow out.

Having previously cut the grooves in the upper wax rim, we now insert the rims in the mouth and instruct the patient to close just to the point where the rims come in contact in the anterior portion and stop. It is well to give the patient those instructions usually used to secure as nearly correct centric relation as possible. The rims are then transferred from the mouth to the instrument by means of a facebow and mounted in this relation.

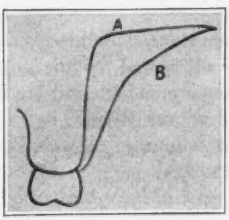

Fig. 13.—Cross-section through posterior palatine area of maxilla. *AB*, depth of tissue over posterior palatine foramen.

The incisor guide-pin is now firmly adjusted. The flat plane of the rims is changed to a curved plane by means of a curved hot-plate, the use of the hot-plate being a quicker method than trimming, and giving a more nearly perfect curve. The only object of producing this curve is to eliminate interference between the two rims as a patient is making the chewing registration. If, at any time, it is noted that the two wax rims are coming in contact during registration, wax should be trimmed away, as the pressure on the two bases should at all times be equalized on the three points of contact; that is, the three tracing studs.

Before the studs are mounted in the upper wax rim, a layer of compound is attached to the lower wax rim, and it is on this compound that the tracing is to be made. Sufficient wax is cut away from the lower rim to allow for the thickness of this compound, which should be about twice the thickness of an ordinary sheet of Kerr's red impression compound. This compound is cut in the shape of the wax rim and formed to the same curve and chilled thoroughly. Sufficient wax having been cut away to allow for the thickness of the compound, it is now attached to the lower wax rim by means of sticky wax and the instrument closed to determine whether the incisal guide-pin has been lifted from its floor and the two rims are now in perfect contact.

The tracing studs are now mounted in the upper wax rim at right angles to the surface of the rim, one in the incisor region in the center and one in each of the first molar areas. They are checked on the instrument against the lower rim to see that they are of equal height.

The rims are now ready to be placed in the mouth for securing the registration. The patient is first instructed to use a chopping motion and move the mandible as far forward and as far laterally, and as far distally as possible. When a patient has discovered his range, he is then instructed to move the mandible forward and backward to the extreme positions from the centric position to the right lateral and left lateral positions and through all intermediate ranges.

The surface of the tracing studs, being triangular in form, and flat, and having sharp edges, acts as a scraper in planing down the compound in the three areas, which gives us the record of that patient's movements. When the tracing is started, the patient often is able to register a strained protrusive, retrusive, and lateral position, but these do not represent the functional positions. By the time he has planed down the area to a rectangular diamond or arrowhead form, the muscles will have become sufficiently tired to fall into their habitual functioning movements, and the apices of the tracings at the completion will be the record of the patient's normal functioning range. These may or may not coincide with the outline of the tracing as it was begun, but the tracing is complete when the irregularities of the converging lines which form the boundary of the flat plane have been removed.

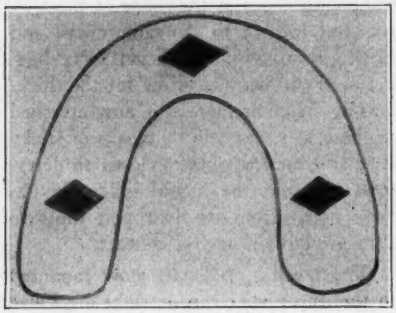

Fig. 14.—Three-point gothic arch tracing made intra-orally.

The upper rim is now replaced on its previous mounting on the instrument, but the previous mounting of the lower rim is discarded and it is mounted to the upper in the new relation. The three tracing studs are placed in the anterior apices of their three tracings, which gives us the relation of the mandible to the maxilla in functional centric relation. The adjusting screws of the instrument are then released and the three tracing studs brought to the respective apices in the left lateral position. This gives us the condylar inclination, and the lateral shift, if there is any, makes positive the setting of the rotation center and gives us the relation of the mandible to the maxilla in the left lateral position.

The same procedure is followed for adjusting the right side. Records are now made of these respective positions and the adjustments again loosened. The tracing studs are then placed in the respective apices which represent the protrusive position. This gives us the relation of the mandible to the maxilla in protrusive relation, and a record is made of this position.

It is important that the several movements be segregated, as the adjustment of the occlusion and the milling in of the finished dentures should be in accord with the relationship in each of the several movements.

As the tissues have been subjected to the similar stresses of mastication by the identical bases which will rest on them when the case has been completed, we now have an accurate functional relation between the upper and the lower denture in all the patient's mandibular movements.

SUMMARY OF RELATIONSHIP STEPS

1. *Wax Bite Forms.*—The wax should be homogeneous and hard, and there should be excess.

2. *Vulcanite Bases or Gold Bases.*—Fit must be accurate. Bases must be vulcanized or cast on casts made from the muscle trimmed impressions. They are the rigid bases, which will be the foundation for the denture. Double vulcanization or its equivalent is used in all cases.

3. *Arch Gage.*— Bite-forms are attached to the bases with sticky wax. The surface of the arch gage is oiled. The gage is warmed sufficiently to be attached to the wax rim, and is centered. The wax rims are carved to the outer border of the gage.

4. *Hot-Plate.*—The wax rims are tried in the mouth and marked for the lip line. The wax is melted down to the line, a slight excess being kept on distal ends.

5. *Calipers.*—The distance from the glabella to beneath the nose and from the nose to the chin are noted.

6. *Pooling Spatula.*—Wax in bicuspid and molar regions on the lower denture is heated and pooled. The patient closes in as nearly centric relation as possible to establish the correct relationship between the upper and the lower biteplates. The excess wax flows out over the buccal and lingual walls. This acts as a guide for setting together to mount on the articulator.

7. *Facebow Transfer Made to Articulator.*—The condyle may be located by attaching the bow to the lower denture. The incisal guide-pin is set to preserve the correct intermaxillary relation.

8. *Spherical Forming Plate.*—The occlusal surfaces of the rims are changed from a flat surface to the arc of a 4-inch circle. This is to eliminate interference between rims during mandibular movement.

9. *Compound Bite Rims.*—The compound is carved and wax cut away on the lower denture to allow for the thickness of compound. The rims are attached with sticky wax.

10. *Registration Cutters and Pliers.*—The positions are in the incisal region and on each side in the molar region. The pliers are heated and cutters placed in the upper wax rim. They are then placed at right angles to the curved rim. The articulator is closed. The cutters must touch equally on the compound rim below.

11. *Method of Securing Tracing.*—The rims are placed in the mouth. The patient moves the mandible in all positions, first with a chopping motion. The cutters have a flat triangular surface with sharp edges. The patient slides the mandible to all positions possible and planes down the surface of compound included within this range. The resilient tissues of the ridges are under equalized masticating pressure at all times.

SETTING THE INSTRUMENT

1. Remove the incisal pin. 2. Loosen all adjustments. 3. Set protrusion first and record condyle inclinations for both sides. 4. Set the right lateral position next, recording the lateral shift and condylar inclination. 5. Set the left lateral position, lateral shift and condylar inclination. 6. Have all three studs in the respective apices of the tracings for setting registrations. 7. Replace the incisal pin for setting the horizontal path of movement and incisal control of the instrument. 8. Raise the pin till free from contact with the incisal guide plate. 9. Release all three screws on top of the incisal guide unit. 10. Set right screw first, always. 11. Set tracing studs in right apices of the tracings and set right incisal control plate in contact with the incisal pin and lock. 12. Repeat on left side, and lock.

This is a mechanical control for the rotation centers on the instrument or the correct control for interdigitation of teeth in movement. These registrations should be recorded so that the instrument can be reset to the case at any time.

The posterior controls for the condyle bar are for the purpose of retaining the centric occlusion, when the instru-

ment is being used independently or without the incisal guide pin. After all settings are made, including the incisal controls, the instrument is moved to the right and the left posterior control set at a point where it will harmonize with the incisal angulation. The incisal pin is moved to the right, being kept in contact with the incisal control, and the left condyle bar control is moved until, when tightened, it is just in contact with the condyle bar. This is repeated on the left side, preventing the posterior controls from interfering with the lateral path movements, as registered by the incisal controls.

When the rotation centers of the case are outside the width of the instrument, the control will not be in contact when the case is moved in the lateral range with the incisal guide pin in place.

Both posterior controls and incisal guide pin will function harmoniously in all cases where the rotation areas are within the width of the instrument.

The posterior controls are essential for retaining a correct central axis for closing the articulator and are adjustable within the range of the articulator to prevent them from becoming an interference in cases where rotation centers are within the width of the condyles.

SELECTION AND SETTING UP OF TEETH

In the selection and setting up of teeth, we have come to understand that it is unnecessary to sacrifice esthetics for mechanics, and vice versa. They are interdependent, the teeth which look best usually being the teeth which will work best, if they are set up according to the best mechanical principles for each case.

To obtain harmonious results, we should make a continuous study of Nature; i. e., we should have an appreciation of the relations of natural dentitions as they appear in the mouths of our patients and of persons we meet in the street, taking into consideration the outline of the face and regularity of the features; e. g., a square face usually requires a square type of teeth, and irregular features, a similar arrangement of the anterior teeth.

In working out a practical case, how can we, as dentists, best take advantage of what Nature has given us as a guide in restoring lost dentition? To answer this, we must first have an appreciation of the elements which will assist us in reproducing Nature.

There are three main factors in the selection of teeth to fit any case: form, size and shade.

Form.—In deciding what form should be employed, we take into consideration: the type of face: square, tapering, ovoid; and the type of arch: square, tapering or ovoid; and the various combinations of these as are shown by charts and models.

Size.—The size of the teeth for the case is governed by the following: (a) in the anteriors: (1) the distance between the arches; (2) size of the face, and (3) size of the arch. In the posteriors: (1) the distance between the arches, which governs length, and (2) the stress-bearing area of the mandible which governs the occlusal area.

There is a definite and distinct relation, 2.5:1, between the area of the mandible receiving stress and the area of the occlusal surface of the lower posterior teeth.

It is always better to err on the side of employing the narrow rather than wide posteriors. The area covered by the lower denture is usually far too small to support the stress that is brought to bear upon it.

Shade. — In deciding the shade, we have found that age is the most constant

factor, the teeth becoming darker as the patient gets older. The tendency is for people with fair complexions to have teeth in the lighter shades and people with dark complexions to have darker shades of teeth, but this is by no means constant.

Keeping in mind the various aids that we have mentioned in selecting the teeth to fit the case, we should not lose sight of the fact that the dentist's sense of what is going to be fitting is the deciding factor in determining what molds and shades of teeth should be used.

Setting Up the Teeth.—In setting up teeth, various methods and articulators were employed by members of our group, the results obtained being at least as much dependent on the skill of the operator as on the type of articulator used. In selecting an articulator, the operator should use an adjustable instrument with which he is familiar and with which he is confident that he can reproduce the movements of the mandible.

Many operators in setting up teeth use the cuspidation method; i. e., the maxillary teeth from the central incisors to the mesiolingual cusp of the first molar rest on a plane with the exception of the lateral incisor, which is set from 1 to 2 mm. above; and the lingual cusp of the first bicuspid, which is about 1.5 mm. above the plane.

The first molar is tilted at such an angle to the plane that the mesiobuccal cusp is approximately 0.5 mm., and the distolingual cusp, from 1 to 1.5 mm. above the plane, a compensating curve being thus developed. The second molar is tilted approximately twice as much as the first molar. A third molar is not used unless there is an exceptionally long ridge.

The lower teeth are then set up in occlusion with the upper and various minor adjustments are made in either to bring about a balance.

Esthetics.—Throughout all this work, the value of esthetics is not overlooked. In particular, we endeavor to use teeth of such a shade and mold as will be in harmony with the characteristics of the face. To accomplish this, various molds and shades may be incorporated in the same denture. Staining or grinding of individual teeth or irregular arrangement of one or more teeth is frequently of great help.

Thus far, we have dealt only with cases which were entirely edentulous. If some of the natural teeth remain, we cannot stress too strongly the importance of obtaining the shade from these and of making models to guide us in our arrangement of the artificial dentition. Even if immediate restorations are made, these may be a great aid at some future time. Other factors of great help are the making of a profile and taking of pictures before the teeth are extracted and when the case is completed.

As a permanent record for assistance in future cases, it is a good idea to take sectional impressions before the teeth are extracted, set the natural teeth in these and run up the models in stone. These, along with pictures, profile and diagnostic chart, give us a complete record of the case and something to refer to if we should, at some future date, run across a similar case.

MILLING IN OF DENTURES WITH ROTARY OCCLUSAL GRINDERS

After the dentures are finished, they are taken to the old mountings on the articulator, the instrument being set to the readings had at the time of mounting the case. Sticky wax is placed on the rim of the dentures to hold them securely on the casts. Plaster is added, covering

about one-half of the labial and buccal flanges of the upper denture from tuberosity to tuberosity. The plaster is carried on the lower denture over the labial, buccal and lingual surfaces up to where it does not interfere with the upper teeth in their movements in all positions, and, with plasticine or clay, a trough is made on the labial, lingual and buccal surfaces of the lower teeth, high enough to retain the grinding compound and still not offer interference with the grinder movements. The extremely high places are ground with a fine stone. Carborundum powder, grit No. 120 and glycerin are used to make a thin paste. This mixture is placed in the trough to cover the teeth or a milling paste is used. The grinder is now released, and the articulator latched in centric relation, and the belt is placed on the lathe and pulley of the grinder.

1. Hold the incisal guide pin lightly yet firmly to prevent tilting of the upper case when tension is placed on pulley belt. Grind in centric occlusion, holding the articulator open a little at first and gradually closing. Grind only enough to free the occlusion.

2. Set the condyles for protrusive readings as previously recorded. Manipulate the condyle axis of the articulator so the anterior teeth have an end-to-end bite and grind to that position only to relieve the interference.

3. Set the articulator for right and left lateral positions and manipulate the grinder right and left laterally, only enough to free the occlusion.

4. Grind in centric relation only a little. The grinder is in constant motion as the different movements are made.

5. Take the lower denture off of the articulator, place it on the upper and see if the centric occlusion is freed. Wash both cases free of carborundum. See that the occlusion has been freed in the lateral and protrusive relations. At all times, be careful not to grind off the cusps of the teeth. If results are satisfactory, polish the ground surfaces by means of disks or pumice. If more grinding is required, add milling paste and regrind the various positions as before.

It is important that good occlusion has been maintained before milling in is attempted or there will be excess grinding in some portions of the teeth.

EVOLUTION AND DEVELOPMENT OF NORMAL OCCLUSION*

By MARTIN DEWEY, M.D., D.D.S., New York City

OCCLUSION is defined as the relation of the teeth of one arch to those of the opposing arch. It will be noted in this definition that we have departed from the usual definition, which was: Occlusion is the contact of the teeth of one arch with the teeth of the opposing arch. It is my contention that occlusion of the teeth is only a relation between the two functioning groups of teeth and does not necessarily imply a contact. This statement is based first

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upon the fact that a great many of the functioning teeth of the lower arch do not strike those of the upper. This is particularly true of such teeth as perform the function of prehension and deglutition. I realize that some will contend that teeth are only performing the function of prehension and deglutition and are not in occlusion. It is true they are not in contact, but they nevertheless have a definite relation to each other and a definite relation to the face and cranium.

It must be remembered, in considering any definitions of occlusion, that teeth are placed in a certain relation to each other so that they may perform a definite and positive function. Any consideration of occlusion which does not place the function of the teeth first is necessarily going to be misleading and may present incorrect ideas. A study of the relation of the teeth which is based upon function shows that there has always been a close relation between the arrangement of the teeth and the function which they were to perform. The primary function of the teeth is the securing of food. The first act in this process was prehension. The oral cavity developed from the simple and primitive forms found in the invertebrates to those found in the vertebrates.

Along with this development in the anatomy of animals, the epithelial cells of the external skin were carried into the oral cavity by the increase in length of the animal, which was a result of the action of the mesoblastic cells. The epithelial cells of the external skin in the fish and reptiles had developed as organs of protection. As these epithelial cells were carried into the oral cavity, they developed a different function from that of protection. The first act was prehension, in which the animal grasped anything which seemed to be food. As a result of this use of the structure, the epithelial cells began to assume different shapes in order to be better able to function as was intended. Consequently, we find that these masses of epithelial cells were finally referred to as teeth, and thus we have the first step in occlusion, which is now designated as occlusion of tooth-bearing surfaces.

These tooth-bearing surfaces were located on different anatomic structures and bones. We find the vomer, the palates, the maxillae and the premaxillae most often used for support of the teeth in the upper arch. In the lower arch, we find the mandible, the tongue and the hyoid bone often supporting teeth. You will therefore realize in studying the different bones that bear teeth that Nature intended only to establish and arrange the teeth in such relation to each other that they would be able to perform the necessary function in assisting the animal to secure food.

Along with the arrangement of the teeth on different osseous structures, we notice a change in tooth form, which was also for the purpose of increasing efficiency in function. These changes resulted in the primitive epithelial organs developing into a long slender tooth for the purpose of prehension; while in other animals an exactly opposite evolutionary change occurs, such as the teeth becoming flat for the purpose of crushing. Each of these seemingly widely separated tooth forms originated from the same epithelial organs that were carried into the oral cavity at the time the vertebrate showed a developed increase in length due to the multiplication of organs developing from the mesoblastic cells.

Along with the study of the evolution of occlusion, it is interesting to note that all of these primitive teeth were attached by fibrous membrane, just as the scales of animals are attached. In other words,

the primitive teeth in early types of occlusion did not have any direct osseous connection. In these animals, this lack was compensated by the fact that they had teeth of continuous succession. When the teeth were completely lost, new teeth constantly grew to replace them and to continue the function. We find in this primitive type of occlusion of tooth-bearing surfaces that Nature was evidently experimenting by trying to work out a new form of tooth attachment for the function intended.

We find in the higher form of fish that some of the teeth in one part of the mouth are attached by a fibrous membrane, while teeth in another part of the mouth are attached by ankylosis. In some animals, we find a third type of tooth attachment, which is more or less a combination of the hinged tooth and the ankylosed tooth and is known as a hinged attachment. This hinged attachment was developed for the special purpose of deglutition. We find that certain animals have deglutitory teeth that are ankylosed, an example of which is the teeth in the nonpoisonous snake. While these teeth may well be considered as prehensile, they are also so shaped as to make deglutition very efficient for those animals.

Attention has been called to the fact that occlusion is simply the arrangement of the teeth in one arch in relation to the teeth of the other. This arrangement is also based upon the functions which the teeth are to perform. In the prehensile teeth of the nonpoisonous snake, the teeth are not in contact at any time, either occlusally or approximately. When we consider the poisonous snake, we find the poison fang so related as to be protected by the other teeth, but having no contact with them. We find, in these tooth bearing surfaces, that the function of the teeth is seizing and crushing. In the teeth which perform the function of deglutition, we really reach the second stage of occlusion, that is, occlusion of rows of teeth. The swallowing teeth, being more highly specialized than the seizing and crushing teeth, are reduced in number, and consequently they are arranged only in rows. This arrangement does not as yet bring the teeth into occlusal contact; in fact, there is not even an approximate contact.

A second step in the evolution of the occlusion of teeth is the arrangement of the teeth in rows. We find that the number of teeth present in the oral cavity has been reduced in this type of occlusion as compared to occlusion of masses of teeth. We also observe that the continued function of the teeth is beginning to play a part in the shape and size of the mandible and the maxilla. In fact, it is influencing the shape and size of the face and cranium. We find beautiful examples of organs and structures being adapted to function. This condition is perfectly illustrated in the alligator and crocodile, whose peculiar anatomic structure force them to keep the mandible close to the ground. Their teeth are arranged in rows for the purpose of prehension. The other functions that the teeth perform are simply those of tearing, which is second to the function of seizing. As an example of adaptation to function, we find that the arrangement of the condyle and the glenoid fossa is different in the alligator and crocodile from that in animals that possess longer legs and are thereby enabled to keep the mandible off the ground. In most examples of this kind of occlusion, in which the teeth are arranged in rows, the shape of the tooth is only that of a primitive cone. These animals have no crushing or grinding teeth.

The third stage of occlusion is that of individual teeth. This condition is

brought about in some animals by the conical tooth, which we find in the second type of occlusion, being brought into contact approximately by the decrease in length of the maxillae and mandible. Some of these types of occlusion, such as that of the armadillo, which is nothing more than the occlusion of prehensile teeth and such occlusal surfaces as the teeth eventually possess, are produced by the wearing of the conical teeth by the teeth of the opposing arch.

The fourth stage of occlusion, namely, occlusion of cusps of teeth, can be traced back to the second and third stages of occlusion. In fact, if we go back far enough, they can be traced to the first stage of occlusion. All animals that have occlusion of cusps of teeth developed from ancestors that previously had single cusped teeth. The structure of the teeth as we find them in fossils and also in certain living examples indicates that all of them have not evolved in the same manner. In one type, the multicusped tooth seems to have evolved from the fusion of a number of simple conical teeth. This type of tooth is found in mammoths and mastodons and other fossils found in Africa, and in the elephant of today. The elephant has only one molar in each side of the jaw to function in occlusion except during the transition period when one tooth is being replaced by the succeeding tooth. The molars are made up of a series of plates of dentin and enamel fused by cementum, which covers not only the dentin but also the enamel of the crown. The multicusped teeth of the majority of living mammals show anatomic and embryologic evidence as well as fossil evidence that they have evolved from a single conical tooth by the addition of other cones or cusps. These cusps were arranged in response to functional demands. In a great many instances, the primitive cusp of the original conical tooth has been submerged in size and the secondary cusps have developed to an equal or greater size in order that the animal might be able to utilize the food supply of the age in which he was living. The maxillary molars of man give evidence of having developed from a single conical tooth by the addition of two secondary cusps or cones. In the maxillary molars, the protocone has shifted to the mesial side and become the mesiolingual cusp. The paracone, which is the front cusp in the molars of animals in which the cusps are arranged in rows anteroposteriorly, has shifted to the anterior-buccal side and become the mesiobuccal cusp. The metacone, which is the posterior cusp in a certain type of fossil in which the three cusps are arranged in a row, has shifted to the posterior-buccal corner and become the distobuccal cusp, this giving the occlusion of three cusps in a triangle.

As a result of occlusal stress through function, the three primitive cusps of the molars have shifted in opposite directions, the protoconid becoming the mesiobuccal cusp; the paraconid, the mesiolingual cusp, and the metaconid, the distolingual cusp of the primitive mandibular triangle, which is now known as the trigon. This produces a cutting relation similar to that found in the carnassial teeth of carnivorous animals. In other words, the cusps pass each other but do not have a grinding or pestle-mortar arrangement. As a result of increased functional activity of the mandibular teeth being located in the mandible and, therefore, more susceptible to functional conditions, we find a projection developed on the posterior-buccal side in the original mandibular trigon which is a heel and is known as a talon and which grows out distobuccally carrying a developing cusp. We now have two

fossae in the occlusal surface of the mandibular molar, one of which is formed by the three cusps of the trigon, and the posterior one by the protoconid or the mesiobuccal cusp, the metaconid or the distolingual cusp and the hypoconid or the distobuccal cusp.

This posterior fossa which has been formed on the mandibular molar and developed by the hypoconid now receives the protoconid or the mesiolingual cusp of the maxillary molar. As a result of this functional arrangement, we find the hypoconid, the metaconid and the protoconid increasing in size or at least holding their own, while the paraconid of the mandibular molar gradually becomes smaller until finally this cusp and its supporting root is lost. With the loss of this cusp, the primitive fossa of the trigon of the primitive molar is lost, and the posterior fossa is developed in size until, in the case of man, it is referred to as a central fossa. It now becomes the principal fossa from the standpoint of mastication, but is secondary from the standpoint of origin.

In the second mandibular deciduous molar, we find the primitive fossa, which was formed by the protoconid, metaconid and paraconid, is still known as the mesial fossa. The paraconid can still be seen as a rudimentary mesial cusp. We also find a marginal ridge extending from the mesiolingual cusp or metaconid to the mesiobuccal cusp or protoconid of the second deciduous molar. In the maxillary molar, the original fossa that was formed by the protocone, metacone and paracone is known as the central fossa. The distobuccal cusp of the mandibular molar or the hypoconid occludes in this fossa. On the distolingual surface of the trigon of the mandibular molar, a talon developed which carried a hypocone, and it exists today as a distolingual cusp. In the maxillary molars, each one of the original cusps retains the original roots which developed to support it. In the mandibular molars, the roots supporting the paraconid and protoconid are fused, forming a large flat root, the greatest diameter extending from the buccal to the lingual side. Owing to the fact that the talonid of the mandibular molar has developed two or three cusps, it became necessary for a special root development to support this cusp. Therefore, we find the mandibular molars passing a large, round, conical, posterior root. On the upper molars, the talon did not develop to such functional importance and, therefore, never developed a root of its own. In the arrangement of these cusps buccolingually, we find the lingual cusps of the maxillary molars occluding between the buccal and lingual cusps of the mandibular molars.

At one time, the maxillary first molar attempted to develop an extra lingual cusp to occlude with the lingual surface of the lingual cusps of the mandibular molars. This cusp remains today as the rudimentary cusp which is found on the lingual surface of the mesiolingual cusp or the protocone of the maxillary molars. This rudimentary cusp also substantiates the fact that supplementary cusp formation has always been associated in the beginning with the protocone or protoconid.

The evolution of occlusion has been the adaptation of organs to perform a definite function. Today, function is playing just as great a part in the production of normal occlusion as it did during the evolutionary changes that occurred years ago. Certain types of malocclusion occur because certain functional activities have become abnormal. In these cases, we find it impossible to maintain the proper relation of the teeth to the jaw and to the face and cranium, unless these functional activities can be established.

VINCENT'S INFECTION*

By A. J. THOMPSON, D.D.S., Kansas City, Mo.

VINCENT'S infection is known as trench mouth by the layman. It was called Vincent's angina by our profession for a long time, but as the word "angina" refers to the throttling, choking or smothering experienced when tonsils or pharynx are affected, it is not descriptive of the type of cases which dentists are called on to treat. For this reason, the name "angina" is no longer used by dentists. Vincent's infection, taking its name from Vincent, the French physician, who first wrote of it, in 1896, is a fitting appellation and seems to have been generally accepted.

It is a disease that continues, more and more, to claim the serious attention of the dental profession. It is comparatively new, it being safe to assume that few dentists had had any large experience with it previous to the World War. Since the return of the soldiers from France, where a large percentage of men of all ranks were affected, it has grown steadily worse, increasing to the extent that, today, the number known to be affected constitutes a considerable percentage of the population of the country.

Dentists, generally, are beginning to recognize the disease, and many of them undertake to treat it, with varying degrees of success. Few of them seem to know or understand the serious nature of the disease, as is clearly shown by the fact that teeth are constantly being extracted when there is a virulent case of Vincent's infection existing in the mouth, often with serious results, sometimes with fatal results, and in spite of the fact that, under such conditions, any mouth surgery is contraindicated.

The medical profession, likewise, is not giving this condition the attention it deserves. Not long ago, a patient of mine living in another city was so extremely ill he probably would have died had not a dentist been called in consultation, after a tonsillectomy, when a serious case of Vincent's existed in the mouth undiscovered and untreated. Dangerous sequelae are likely if nasal, sinus or throat operations are performed under such conditions.

The disease may be classified into two forms: acute and chronic. The acute form is easily recognized. In a typical case, the patient is seriously ill and comes to the dentist with an inflamed condition of the soft tissues of the mouth. A grayish white membrane appears at the gingival border of the teeth, covering a marked, bleeding slough. Pain is generally present and sometimes severe. It may be absent. Loss of sleep and loss of appetite are common, and frequently an increase of temperature of two or three degrees is found. A metallic taste is complained of. An offensive odor is characteristic. In some cases, the patient may be

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ill enough to be confined to bed, and such cases are likely to be treated by a physician, the dentist sometimes being called in consultation.

The chronic form is not characterized by pain or soreness and generally not by any systemic disturbance. Hemorrhage is the outstanding symptom and destruction of the soft tissues is common. Profuse bleeding has caused the alarm that induced the patient to consult a dentist. The bleeding may become sufficiently active that the pillow is covered with blood during sleep. A small artery may open, which causes the blood to come in spurts. Bleeding is not generally noticed, except during the brushing of the teeth. Another condition that I have found existing in the chronic form is entirely different: There is no local indication of the disease. A smear shows a four plus reaction. A general feeling of malaise may be the only evidence of systemic disturbance. Diagnosis is made by means of the microscope only, and discovery in this form is possible only to the operator who makes examination for Vincent's infection a part of the routine of a general examination. Intensive and prolonged treatment is required in these cases. Three such cases that I have had under my care have impressed me with the possibility that unrecognized and untreated cases of this character may be more numerous than we can readily believe. The person so affected would be a carrier of the disease, and consequently a constant public menace.

How is the spread of this serious disease going to be prevented or mitigated? Are we doing our full duty if we do not warn our patients of the danger of their affecting other members of their families and the public generally, with whom they come in contact? Should patients whom we are treating be advised to stay at home? Should known carriers be quarantined?

These are some of the questions that we, as dentists, are now being called on to answer, and we will continue to be called on to answer if the spread of the disease goes on unchecked.

In Kansas City, children are sent home from school when they are found to be affected with this disease, and are allowed to reenter only when they return with a certificate from a dentist or a physician that they have been successfully treated. Results have proved satisfactory, with no especial objections from school patrons.

Is this procedure equally successful in other cities where it is being tried? This is another question which might find answer here.

In treating any type of Vincent's infection, I find that it is necessary to have a full understanding with my patient, especially those who are strangers to me, before beginning treatment, for, although I do a general practice, I have numbers of these cases referred to me by physicians and other dentists. These patients have no previous acquaintance with me nor with my patients. Usually, before coming to me, they have been treated unsuccessfully. Nine different men had treated one case before I was consulted, and seven, another. After a full discussion of the case and a complete understanding of the extent and nature of the treatment and the probable length of time involved, the patient generally becomes convinced and assured that his troubles are at an end and is ready to do his part in bringing about a recovery.

At this time, the patient is reminded of the remuneration that will be required and told that final payment should be made when evidence of the disease is gone. To prevent a recurrence, a follow-up of these cases, for at least two months

after evidence of disease has disappeared, is absolutely necessary. It is surprisingly easy to get the patient to return as frequently, and over as long a period of time, as is necessary provided no fee is connected with such subsequent visits. The patient sees that this is good reasoning and generally agrees to it at once.

In the diagnosis and treatment of this disease, the microscope is absolutely necessary. It is generally conceded that the Vincent spirochete and the fusiform bacillus, when found in large numbers in the mouth, are good and sufficient evidence of the disease. Every dentist should have the service of a microscope, either in his own office, or in a laboratory near at hand. In these days of high-priced office equipment, the cost of a microscope is only another detail and is not prohibitive. The technic is easily acquired, and diagnosis is simple and easy. In a majority of cases, a smear will show that active germs are still present in large numbers after treatment is apparently completed, which makes it obvious that treatment should be continued long past the time when visible or painful symptoms have disappeared. Without the microscope, the patient would probably be dismissed, and go on his way, still an active carrier of the disease.

In the treatment of the disease, the patient should be impressed with its serious nature and should be warned against smoking and the use of alcoholic beverages. The diet should include foods of alkaline reaction, and of such character that elimination is stimulated and hastened. The use of fruit and vegetables only is often most advisable, but individual requirements must be taken into consideration. The use of one's own drinking and eating utensils is advised. The telephone mouthpiece should be scrubbed with an effective germicide after being used. The toothbrush should be used only after being boiled. Mouth washes, such as are directed in each individual case by the dentist must be used regularly and religiously. All of these details are fully discussed and strictly required in my practice, but if there is any one thing that I find necessary to stress more than another it is the subject of smoking. I find the condition more difficult to control, if the patient persists in smoking.

No scientific reason has been offered, to my knowledge, for a connection between the infection and smoking, but the fact that there is a definite correlation is accepted by everyone who has had much experience in treating the disease.

It would be practically impossible to enumerate all of the agencies, drugs and medicaments found useful in treating this disease. In naming the remedies, I will not undertake to mention them all, nor to undertake to name them in any order that would tend to show them in their relation to their value. Nor would I undertake to say that any particular agent or drug is a specific in the treatment of this disease, although perhaps nearly every remedy mentioned has its advocates, each one claiming that his favorite remedy is a specific. In my opinion, there is no one unfailing remedy for all cases.

Treatment by means of the ultraviolet ray is not entirely new, but its use at the hands of a dentist has been very limited. Extravagant claims have been made for it, some dealers going so far as to say that quick and complete cures can be obtained by means of the ultraviolet ray alone and that it is a specific in the treatment of this disease. A few dentists whom I know say the same thing. From my experience with ultraviolet rays, which has been recent and not extensive, I am of the opinion that it is a valuable adjunct in the

treatment of the disease and that its increased use by the dentist is inevitable, once its value is learned. Which method, whether by the water-cooled quartz lamp, or by the carbon arc, is an open question, both methods having their outstanding advocates. Recently, home treatment with neo-arsphenamin as a mouth wash, and the office treatment with ultraviolet rays alone secured marvelous results in a virulent case that affected not only the whole interior of the mouth, but also the throat as well, to the extent that the symptoms of angina were pronounced.

Chromic acid has long had a place in the treatment. It must be used with care, its use being followed almost immediately with some alkaline neutralizing agent, such as sodium bicarbonate, to prevent injury to the tissues. A 7 per cent solution is sufficiently strong, in my opinion, but I know of other men using much stronger solutions, some to 25 per cent.

Hydrogen peroxid is especially valuable. Used both in office treatment by the dentist and as a home treatment by the patient in 50 per cent solution, it is indispensable. The army method of adding 1 grain of mercuric chlorid to the pound of peroxid has value, especially in the first stage of an acute infection, when the streptococcus and staphylococcus may be more in evidence than the Vincent spirochete and the fusiform bacillus. At this stage, also, one of the newer germicides, such as hexylresorcinol, has a place.

Talbott's solution, the old reliable remedy, is indispensable to me. It is germicidal, penetrating, healing and soothing. The formula is well-known, but I will repeat it: zinc iodid, 20 parts; tincture of iodin, 20; distilled water, 10; glycerin, 50.

Silver nitrate, trichloracetic acid, potassium permanganate, potassium chlorate, zinc chlorid and tincture of iodin are some of the older drugs that have been used and still find favor. Mercurochrome, gentian violet and acriflavin and other remedies without number could be named.

Neo-arsphenamin, or sulpharsphenamin, has not been stressed as its use has been confined mostly to the physicians, who seem to get results, especially with those patients confined to their beds, or in cases in which systemic complications are present. Local treatment by the dentist must follow intravenous treatment, or any treatment that a physician might give. This is a mouth disease, and treatment of it should properly be referred to the dentist.

SUMMARY

The dental profession and the public alike need enlightenment on the serious nature of Vincent's infection and should consider methods of preventing its continued increase.

Extraction of the teeth, scaling of the teeth or any surgery in the mouth or throat is dangerous until after the disease is under control.

Treatment should not be confined exclusively to any one drug or method of treatment.

The ultraviolet ray is a valuable adjunct.

Full cooperation of the patient is necessary.

Treatment should include practical as well as scientific means.

After treatment is completed, subsequent appointments are necessary to prevent a recurrence of the disease.

The use of the microscope is essential in the diagnosis and treatment of the disease, and should also be used as a matter of routine in all cases before the extraction of teeth, or before any mouth surgery is attempted.

DISCUSSION

Bruce L. Taylor, Washington, D. C.: This paper has been brought to us at a very opportune time. Too little attention is being paid by the dental profession, to diseases of the supporting structures of the teeth and, as Dr. Thompson has said, Vincent's infection is becoming more and more prevalent each year, for the reason that the dental profession does not recognize it in its early stage and therefore does not institute the proper treatment to cure it before it becomes chronic. Dr. Thompson has described the symptoms and given the methods of diagnosis so graphically that it seems almost impossible for any dentist not to recognize a case of Vincent's infection when making an examination of the mouth. The trouble lies in the fact that the majority of dentists today are too much interested in making crowns, bridges, inlays and plates. The treatment of any inflammation of the oral cavity or diseased condition of the gingival tissue is just as important as the making of a crown or bridge and such treatment is not fair to the patient if employment of one of the various mouth washes that are touted so highly in our journals is the only treatment instituted. We must seek out the cause and remove it, and then, and not until then, will we get results. Let us get together and stamp out this infection. For the past eleven years, my time in the office has been devoted entirely to the treatment of diseases of the supporting structures of the teeth and the various diseases of the mucous membrane of the mouth; and it gives me pleasure at this time to outline the treatment which I have, by clinical experience, found best. The object of this treatment is to cure the patient of Vincent's infection in the shortest possible time. I use the same treatment for both the acute and the chronic forms, first spraying the mouth thoroughly with an antiseptic solution. Then, with small pledgets of cotton held in the pliers, I wipe off all starchy foods and soft deposits around the neck of the teeth, and in between the teeth. After this has been thoroughly done, I spray the mouth and between the teeth with surgical solution of chlorinated soda. A small pledget of cotton held in the pliers (a small applicator may be used) is dipped in a solution of chromic acid and every inflamed area is touched. Care should be taken to see that the solution flows through every interdental space. If there is any infection of the buccal mucous membrane, it should be treated in a like manner. If any excesses of acid should accumulate between the cheek and gum tissues it should be wiped away with cotton or a piece of gauze, as otherwise it may irritate the tissue. The acid is not to be neutralized or the spray used after the acid is applied. The patient is permitted to spit out the excess but not to rinse the mouth. This treatment must be repeated daily until all inflammation and soreness has subsided. After the infection has been cleared up, the patient should be given thorough prophylactic care, all deposits of calculus below the free margin of the gum being carefully removed and all surfaces of every tooth thoroughly polished. If we neglect to do this, there may be a recurrence of the disease, or it may become chronic. In fact, a great many chronic cases may be traced to failure to give thorough prophylactic care. A mouth wash of sodium perborate is prescribed, 1 level teaspoonful to half a glass of water, to be used at least five times a day, on arising, after breakfast, lunch and dinner, and before going to bed. The patient should not use the toothbrush until all signs of inflammation have subsided. The old brush should be discarded and a new one purchased when the infection has been cleared up. In the meantime, he should be instructed to wipe the teeth and mouth clean with a piece of gauze dipped in the solution of sodium perborate. Diet is an important factor in the treatment of Vincent's infection. The patient should be instructed to eat at least two oranges or half a grapefruit, or to drink two glasses of lemonade each day. He should eat such foods as spinach, kale, celery, lettuce, asparagus, tomatoes, watercress, raw cabbage and carrots, avoiding white bread, potatoes, cream of wheat, oatmeal and pastries of all kinds; in fact, any kind of food that has a tendency to stick to the teeth. Drinking hot liquids and smoking should be avoided; in fact, anything that may have a tendency to irritate the gums or mucous membrane of the mouth is to be avoided. I use chromic acid and sodium perborate because they give off a greater percentage of free oxygen than any other medicaments that could be used in the mouth. The destruction of these organisms requires an oxydizing agent. For the past fifteen or twenty years, I suppose, I have used every treatment that has been suggested for the cure of Vincent's infection, and the treatment I have suggested today, I have adopted because it gives the best clinical results in

the shortest time. I have never had a case which did not respond to this treatment. An acute Vincent's infection usually clears up in five to six days; the chronic in from ten days to two weeks; but, as I said before, the patient must be treated each day.

W. M. Reppeto, Dallas, Texas: Because the disease commonly known as Vincent's infection is so little understood, much more time is spent upon its discussion than might be necessary under different circumstances. A background of a few of anatomic, physiologic, histologic, bacteriologic and pathologic facts concerning the mouth is necessary to understand this disease entity which the dental profession is so often called on to treat. It is a sad fact that the average member of our profession is sadly lacking in the possession of such a background. When we consider the serious and complicated disease processes met with by the average medical practitioner, it seems a shame that we have not been able to better control this comparatively simple infectious process, which is one of the few we are called on to treat. Dr. Thompson has said that dentists are beginning to recognize the disease and it is high time that they were doing so. The question which has arisen in my mind after some experience with so-called Vincent's infection is whether there are many cases diagnosed as such which are specific infections caused by the spirochete of Vincent and the fusiform bacillus. The study of smears evidences a symbiosis between the so-called specific organisms of Vincent's infection and streptococci and staphylococci. Is not the question as to which type or group of organisms is the infectious agent a pertinent one? Practically all smears will show the organisms of Vincent's infection, but are all those patients suffering from Vincent's infection? Decidedly not. Nor are those individuals in whose mouths it is possible to demonstrate streptococci, staphylococci or pneumococci suffering from the specific effects of those organisms. Thus, the scientific value of the smear decreases. The smear can very well be used in any case to tell us which organism dominates and, after a consideration of such facts, it will be found that there is a grouping of cases showing characteristic clinical symptoms which agree with the bacteriologic findings, and intelligent treatment can be instituted with success, usually in a short time. In those cases which do occur in what might be called clean mouths presenting symptoms of extreme hyperemia, edema and some necrosis of tissue, the preponderance of staphylococci is remakable. Treatment instituted should be of the type to destroy and inhibit the growth of that type of organism. The so-called chronic case which is probably only a case of periodontal disease in a very active stage usually shows a streptococcic origin, at least as far as the smear is concerned. This type of case might be called a periodontitis, and treatment of the gingival symptoms alone usually is of value only from a standpoint of treating symptoms and is not getting at the seat of the trouble and treating all the tissues involved in the syndrome of the disease. The medical profession is gradually separating itself from empiricism as far as possible and is attempting to treat the underlying causes of disease rather than to use only mitigative or palliative treatment. The type of case in which sloughing of tissue is the paramount objective symptom and a burning sensation of the mouth tissues concomitant with slight or exaggerated systemic symptoms of toxemia is present, and wherein the Vincent's organisms are in the majority, may, from a practical standpoint, be called a true Vincent's infection, but microscopic study will demonstrate that such cases are relatively few in number. It is not meant, of course, that oxygen liberating medicaments are not necessary to aid in the treatment of any of these types of cases because such treatments are necessary to retard the growth of organisms of the anaerobic type, which unquestionably do complicate most of the diseases affecting the gingival tissues. Might it not be true that because of their detergent action, such substances as hydrogen peroxid and sodium perborate have more therapeutic value than liberated nascent oxygen? This leads up to, in my opinion, the most important phase of treatment, which is the institution of hygienic principles in the mouth. Dr. Thompson has advised against surgery or scaling of the teeth while the disease is not under control. Extraction, of course, should not be done at this time, but scaling of the teeth is perfectly permissible and safe at any time during the course of the disease, if done with a reasonable amount of care. This fact seemingly is appreciated by few men, and scaling has been taboo by those who do not understand the factors involved. The removal of deposits of a supragingival nature followed by removal of

stains from the teeth by means of a mixture of pumice and hydrogen peroxid used with a rubber cup and the handpiece accomplishes two things: the bacterial count of the mouth is definitely lowered; and the mechanical irritation to the gums by calculus is reduced to the minimum. Comparable procedures are not in conflict with the principles of the treatment of bacterial infections elsewhere, so why not use them? Many cases will show rapid improvement from the foregoing treatment alone, no topical applications being used, but it would be inadvisable to give the impression that all cases will react in a satisfactory manner through such therapy. The use of a mouth wash containing some such substance as wine of ipecac to stimulate cell secretion and excretion to prevent what might be called tissue constipation is advisable. Other constituents of such a mouth wash which are of value are hydrogen peroxid, Fowler's solution and glycerin. As the case improves, deeper scaling and curettement should be carried out, so that when treatment of Vincent's infection, either of the acute or of the chronic type, is completed, the mouth has been thoroughly treated from a periodontal standpoint. For these reasons, I surely must take issue with Dr. Thompson when he says that scaling of the teeth is contraindicated in cases of Vincent's infection. Such a statement should not be left unchallenged, as it is not scientifically founded and is potentially dangerous in the effect that it may, if accepted, have on the treatment of many cases which clear up from the standpoint of the acute symptoms very slowly, a periodontal injury having been caused which may later contribute to the loss of teeth. Topical applications of various types are certainly of great value, but the main basis of rational treatment is cleanliness of the involved tissues and their environment. The use of ultraviolet rays in the treatment of Vincent's infection is decidedly empiric, and it is not until we have better controlled experiments that we will be able to put our stamp of approval on such a therapeutic measure. Many case reports include the use of some other therapeutic measures, which would have produced good results had the ultraviolet ray not been used. Dr. Thompson speaks of there being no scientific explanation of the relationship of smoking to Vincent's infection. It would seem correct to say that the presence of such a potent mucous membrane irritant in tobacco as nicotin might well explain the obvious relationship, which clinicians have been aware of for some time.

Dr. Thompson (closing): Dr. Taylor has called attention to the fact that the profession gives more attention to restoration than to prevention, and most of us will agree with him. Our education and training has been in reconstruction, and too little in prevention. A man is likely to judge his own ability and his standing as a dentist in proportion to his ability to construct a bridge, a crown or an inlay, and to pay little attention to prevention and to such average commonplace things as cleaning teeth. And he may well have pride in such things; but how much more pride he should have in maintaining a mouth in such condition that these restorations are unnecessary. The treatment of Vincent's infection with chromic acid, although some men condemn it on account of its likelihood to cause burns, as too powerful a remedy to be used in treatment. In my practice, as in Dr. Taylor's, it is still a valuable treatment, but his method of treatment has not been so successful from my point of view. In discussing this point before a group of dentists not long ago, I emphasized that we should use compressed air and apply the chromic acid with applicators in order that the medicament might reach to the bottom of the socket, and one of the dentists said, "Why go to all that trouble? It is no trouble to get it in there by capillary attraction." I said, "You don't get me at all. When I spoke of applying chromic acid, I spoke of a dry socket. When you speak of using a capillary attraction, you are speaking of a wet socket." Suppose we tried to put a little medicine in a jug full of water. Could we get much medicine in the jug? Wouldn't it be simpler to empty the jug before trying to put anything else in? Trying to put medicine in a socket that is already filled is equally futile. We may think that we are getting some of it in, perhaps, but we are deceiving ourselves, and are not getting definite action. If there is one thing that I wish to emphasize it is the serious nature of the disease, as Dr. Rickert has stated. In Kansas City, a dentist died after extraction of a tooth. One of the best known physicians, 72 years of age, died with Vincent's infection. It is a serious disease.

John Steele, Denver, Colo.: What mode of transmitting Vincent's infection other than by kissing is known?

Dr. Thompson: Aside from the things mentioned here, I think I have had more patients say that the means of transmission was the mouthpiece of the telephone. Evidence along this line may have little or no value. Dr. Reppeto questions the findings of a microscope: I wish to call his attention to the fact that the findings of a microscope may or may not be reliable. In a group of men, perhaps more than half or three-fourths may have Vincent's spirochete in perfectly healthy mouths. It is more than likely that all of this group is free from Vincent's infection. In a group of dental students, not so long ago, among twelve students selected for use in a clinic, one had a virulent case of Vincent's infection, and knew nothing about it. Even in this group of dentists, the microscopic examinations might reveal only a few isolated germs or we might find a case of Vincent's infection existing here, even in a group of dentists. The existence of isolated germs in the mouth is not proof of the disease and nobody claims it to be. Most men, I think, agree with me that that is a case of Vincent's infection in which there are countless numbers of organisms in the mouth. As to the cause, we find the germ in so many healthy mouths. The source of it we have with us all the time when we get below par from overwork, worry, sickness.

R. H. McBride, Salt Lake City, Utah: Has it been your experience in the treatment of Vincent's that most of your patients have been inveterate cigaret smokers, and were not amenable to complete cure until they quit smoking?

Dr. Thompson: In most cases patients are smokers, in some of the worst the patients don't smoke. When I first began to treat women, I had a little difficulty in mentioning the subject. With men, I would say, "You must quit smoking." I used to say to women, "Do you smoke?" I now say, "If you want me to do anything to help you eliminate the disease, you must quit smoking."

LOCAL ANESTHESIA FOR THE GENERAL PRACTITIONER*

By JOSEPH P. ARNOLD, D.D.S., Houston, Texas

THE use of local anesthesia by injection is fast becoming common practice in dentistry; and whenever indicated, it should become a routine recourse for all general practitioners. Successful local anesthesia is not only a most desirable adjunct to the dentist's operative resources, but also a necessary prerequisite for successful dental practice. Various remedies have been introduced from time to time for the purpose of producing local insensibility to pain and to mitigate the fear of pain of dental operations. Most of these have been discarded, for various reasons, such as the unreliability of their anesthetic power, the danger of producing toxic effects on the central nervous systems or a tendency to cause local gangrene and sloughing of the tissues.

In 1905, Einhorn, of Germany, gave novocain to the world, an agent possessed of the anesthetic power of cocain minus its toxicity. This marked a rapid advance in the art of local anesthesia. During the past thirty-five years, different methods of producing local anesthesia have also been introduced. While most of these methods have been used with a fair amount of success in the past, it must be

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admitted that they demand no place in routine practice today, for there is at least one serious objection to each of these methods.

Driving the anesthetic solution into the tissues under great pressure with an all-metal syringe and a short needle was one of the early methods. Pressure was considered essential to success, and this belief still exists among some of the members of our profession today. Usually, hours and days of postoperative pain resulted from this method.

Drilling through the alveolar process near the tooth apex and using a close fitting blunt needle was another means of securing anesthesia, known as the interosseous method.

Injecting the solution under the free margin of the gum along the peridental membrane to the tooth apex, using considerable pressure, was known as peridental anesthesia.

A method whereby the needle was advanced beneath the periostium until the apex was reached probably caused more severe postoperative pain than any of the other methods mentioned. This was known as subperiosteal anesthesia.

A simple, safe and efficient method of procedure, eliminating nonessentials and coupled with a well-developed technic, is a valuable asset in the practice of local anesthesia. The use of local anesthesia has done much for the operative dentist. The very nature of our work is to produce pain, and to employ whatever safe means science has given us to allay the discomfort and fear of dental operations is a duty we owe to our patients, resulting in the benefit and satisfaction arising from their gratitude and appreciation.

The many beautiful results in inlay work, porcelain jackets and three-quarter crown preparations of teeth with vital pulps, have in many instances, been simplified through the use of local anesthesia, and much wearisome strain has been saved both patient and operator. Extremely sensitive teeth in the mouths of nervous patients are being successfully filled today without resorting to pulp devitalization.

Time is an important factor to the busy dentist. Many are under the impression that the practice of local anesthesia demands much time, and as a result, they fail to avail themselves of its wonderful benefits. Local anesthesia, on the contrary, has proved itself to be a time saver, if the technic has been reduced to a clear working basis and nonessentials have been eliminated.

For the general practitioner, the following procedure is submitted after seven years of use. If followed carefully, it will prove successful in practically every instance.

The instrumentarium is as follows: Two carpule syringes, a bottle of rustless steel needles No. 2, gage 25, procain-epinephrin solution in ampules containing 2 per cent procain and one three-thousandths grain per cubic centimeter, a bottle of iodin and aconite, wooden applicators wrapped on the end with sterile cotton, a bottle of alcohol, an alcohol lamp and a sterilizer having both a dry heat and a hot water compartment. As soon as an injection is completed, the empty ampule is removed and a wire is placed in the needle. The syringe, with the needle in place, is put in the sterilizer and allowed to boil for ten minutes. It is then removed and placed in the dry compartment, where it remains sterile and in condition to be used again on a moment's notice. Not over two minutes is consumed in preparing the syringe, the entire procedure consisting of lighting the alcohol lamp, removing one of the ampuls in a glass jar container,

dipping both ends of the ampul in alcohol, igniting the alcohol over the alcohol flame and inserting the ampul in the syringe. This instrumentarium is kept on a table especially reserved for this outfit.

In the upper jaw, we have discarded the use of all block or conduction anesthesia. On account of the spongy and porous structure of the maxilla and the thinness of the buccal plate of bone overlying the roots of the upper teeth, the anesthetic solution finds no difficulty in making its way through the bone to the underlying nerves. Infiltration anesthesia is generally indicated in any of the teeth of the maxillae, and we have had splendid results in following out the technic described and advocated by Posner.

In the lower jaw, the injection has been found ideal. It is possible to use infiltration successfully in the mandible for painless cavity preparation of any of the six anterior teeth. In the chin portion of the mandible, we find numerous foramina, which makes anesthesia possible by infiltration in this region. The mandibular injection is used for all lower teeth posterior from the cuspids. The rustless steel needles No. 2, gage 25, are used both for infiltration anesthesia in the upper jaw and for mandibular injections in the mandible. There is no occasion to penetrate the tissue deeper than one-half inch in making a straight line mandibular injection, and the injections can be made practically without pain with this small needle.

We should always inject slowly. Practically all of the disagreeable symptoms resulting from the use of epinephrin can be eliminated if 3 or 4 drops are injected as soon as the needle punctures the mucuous membrane. Then if a few moments are allowed to elapse for the epinephrin to take effect before the needle is advanced, the remainder of the injection is rendered painless.

Rapid injection will cause after-pain, and is usually the cause of weakness, trembling and rapid pulse, all of which may be avoided in most instances by slow injection. We should avoid pressure, and, in no case, should the needle be forced beneath the periostium.

I can conceive of nothing simpler than the technic submitted, and it is certainly comprehensive to the average dental practitioner. No lengthy preparations are required on the part of the operator or his assistant, and there is no confusion nor useless instrumentarium with which to worry.

DISCUSSION

Howard C. Miller, Chicago, Ill.: Dr. Arnold has referred to the compounding of novocain in 1905 and to the various remedies which have been introduced from time to time for producing local anesthesia. Today, novocain, or procain, as the American product is termed, is the safest local anesthestic known, when properly used. It might be well to mention the more recent reports made on the clinical use of ethocain borate as a local anesthetic in dental operations. This, according to those who have compiled these reports, is much less toxic than procain; the resulting anesthesia is obtained much more rapidly and is equally profound but of slightly shorter duration than with procain in the same quantity, and with the same technic or injection; local postoperative pain is not caused by its use, and it can be combined with a vasoconstricting agent to produce a satisfactory local anesthesia. The clinical use of ethocain borate will necessarily have to be much more extensive before it can be considered as valuable a local anesthetic as procain. Dr. Arnold's reference to the use of pressure in depositing local anesthetic solutions into the tissues should be stressed. Solutions should be deposited slowly, with only sufficient pressure to discharge them into the soft tissues along the mucobuccal fold, or at the entrance or exit of the nerve trunk from its bony canal. This will prevent many of the unfavorable sequelae from the solution being deposited in the more dense surrounding tissues. This is

the method of choice, and it is unnecessary to employ any of the other methods of producing local anesthesia to which Dr. Arnold has referred. The use of local anesthesia for cavity preparation is a valuable aid to the careful operator, but if it is employed by one who uses it in order that he might prepare a cavity or abutment more quickly and cause less pain and discomfort to the patient, it would be far better that he employ no anesthetic. It must be remembered that the use of sharp burs and a careful operative technic is essential in order to avoid overheating of the tooth or injury to the pulp, which may result in its death following such a procedure. Dr. Arnold's technical procedure is the accepted method in the majority of cases. There is a tendency to make a comparison between the deep block and the so-called "infiltration methods." To compare these two methods as different modes of producing local anesthesia is not strictly accurate. In one, the solution is deposited in or around the operative field, and, in the other, it is deposited at some point distant from the field of operation; while, in each method, anesthesia is produced by the infiltration of the nerve endings and nerve trunk by the anesthetic solution. There is no attempt to deposit the solution directly into the nerve trunk when blocking the branches of the fifth cranial nerve. Dr. Arnold has referred to the importance of slow injection to prevent syncope and the nervous symptoms that sometimes occur. To this precaution should be added care to avoid depositing the solution directly in an artery or vein and always to make the injection with the patient in a reclining or semi-reclining position, never injecting in an upright position. After anesthesia has become complete, the patient may be raised for the operative procedure. The successful anesthesia involves the careful application of its fundamental principles in each case, and has as its basis diagnosis, scrupulous asepsis, the use of proper anesthetic solutions, an exact technic and a thorough knowledge of anatomy.

P. G. Puterbaugh, Chicago, Ill.: Dr. Arnold has reminded us that the subject of local anesthesia is not a new one; that while many dentists enjoy its benefits by using it frequently, others employ it for occasional cases only. The abolishment of pain sensation has been the goal which medicine has sought for centuries, but the earliest use of anesthetic and hypnotic medication was to prevent the perception of pain by criminals who were sentenced to punishment under the sting of the lash or the agonies of the bastinado. As we come down through the ages, it became an adjunct to surgery; and the fine art of modern surgical technic never could have been developed without the aid of anesthesia. General surgeons have long recognized the necessity for its use in maintaining quietude and relaxation of the patient, as well as for the prevention of shock. For many years, the use of anesthesia in dental practice was limited to exodontia or other operations involving the structures that support the teeth. In my opinion, it it because the excavation of dentin is not accompanied by hemorrhage or other visible evidence that would direct the operator's attention to the fact that he was invading highly organized living tissues that dentists have been reluctant about employing anesthetics in routine operative dentistry procedures. This is a mistake that is made daily, and Dr. Arnold's paper is therefore timely and worthy of more than a passive reception. Local anesthesia by means of hypodermic medication has reached its present state of perfection only through many years of careful research and experimentation. Today, we can secure adequate and satisfactory anesthesia for the painless performance of almost every dental operation by a simple hypodermic injection. Remember that local anesthesia is not merely a gesture; it should be complete and total in its effect—anything short of that is a failure. The danger of needle abcesses that once were common sequels to hypodermic medication has been banished by the routine sterilization of syringes and anesthetic solutions by boiling. I would not be satisfied to use any short cut substitute for heat sterilization, which we know is dependable. We need have no fear of after trouble traceable to faulty asepsis if heat sterilization is used. The slight amount of after soreness that regularly follows the puncture of tissues with a 25-gage needle and the slow injection of a correctly compounded anesthetic solution is so slight that patients scarcely notice it. It can be regarded as negligible when compared with the comfort in the dental chair that is made possible by the administration of local anesthesia. I can conceive of nothing that will so operate for happy patients and comfortable practice as the routine employment of local anesthesia for all painful procedures in operative dentistry and crown and bridge work.

It should be used for the simple excavation of hypersensitive dentin, three-quarter and jacket-crown preparations and the extirpation of vital pulps, as well as for the extraction of teeth. The constant use of hypodermic medication will soon develop a degree of skill that makes its employment increasingly gratifying. The light weight and fine mechanical construction of modern syringes has simplified and added to the delicacy of their manipulation, and their comfortable balance and nonleaking qualities have been important items in the development of precision methods in their use. The technic that Dr. Arnold has briefly outlined is simple and eminently practical, and while I feel that he could have expressed his ideas more clearly by going a little farther into the details of making the several injections, it should meet the indications for all types of dental procedures. Any man who has experienced the comfort of operating under anesthesia realizes that one will do a better grade of cavity preparation and serviceable dentistry than is possible without it. He realizes that, by its use, he will conserve time and nervous energy for himself as well as for his patients. Perhaps a greater blessing than these is the dissipation of fear and dread of the dental chair that many patients harbor because of its association with the infliction of pain. I would caution you that in the hands of the careless or unsanitary operator, the hypodermic syringe is a dangerous instrument; but with rigid asepsis, guided by a moderate degree of knowledge of anatomy, and with careful manipulation, it is capable of being made the greatest blessing and comfort that has ever been given to operative dentistry. I hope that those of you who are making the extensive restorations that are called for today will profit by Dr. Arnold's paper and that it will inspire you to employ pain prevention methods in all sensitive cases. Anesthesia is truly a necessary adjunct to 1930 dentistry.

Dr. Arnold, Houston, Texas: Dr. Miller also stressed the importance of slow injections, and Dr. Puterbaugh, the importance of not losing sight of the fact that we are working on vital tissue. If local anesthesia is properly applied, there is no occasion to hurry. I make no hesitancy in stating that I am more careful in operating under anesthesia and have really less reason to hurry than under local anesthesia. Everything goes along so beautifully. The patient is quiet and we are quiet, and it makes a great difference in our feeling at the end of the day. One of the first things we must remember is that there is no occasion to hurry, and also that we are working on vital tissue, and must not burn up the tooth.

DENTAL MEDICINE FOR THE GENERAL PRACTITIONER*

By GERALD D. TIMMONS, Ph.G., D.D.S., Indianapolis, Ind.

DURING the past few years, much controversy has arisen in the dental profession over the subject of "patent medicines." Much has been done to clear up the situation, but it never will be entirely cleared up until the average dentist discontinues prescribing these various remedies. This utopian state cannot be attained until the average dentist begins to realize that he, as well as the physician, is capable of writing prescriptions to care for the situations which may arise in his practice. In the past, the dentist has been too prone to consider himself purely from a mechanical stand-

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point, and until he can be made to think otherwise, no relief from the present situation can be expected.

The practice of analyzing the various patent remedies and publishing their formulas in THE JOURNAL has been an admirable thing, but it is rather disappointing to hear discussions on these topics and learn just how few dentists really read these excellent articles. Also, it is a sorry state of affairs that after reading these articles and having his pet preparation exposed and explained, the dentist is at a loss for a substitute for this preparation because of a lack of knowledge of materia medica and pharmacology. This may be the fault of the schools, but that is extremely doubtful. It is more probable that the laxity of the dentist in keeping up with his profession is the real reason.

Practically all discussion of this subject can be classified as destructive criticism. In this paper, it shall be my purpose to offer standard substances and compounds which may be used in the average dental practice; in other words, constructive criticism.

As has been taught for so many years, remedies are divided into two large classes: general and local, and since the dental field of operation is circumscribed, it necessarily follows that most remedies used by the dentist will fall in the local class provided the general rule for the application of a remedy is adhered to. This rule is always to apply the remedy directly at the point of lesion whenever it is possible. There are instances in all practices when it is impossible to control certain conditions by the application of local remedies, and it is in these situations that a dentist should be capable of writing a prescription for the patient. This is not the general practice today. Instead, the patient is either handed a printed prescription prepared by the manufacturer, with the instruction to stop at a drug store, this printed slip being used simply as a memorandum; or the patient is handed a sample of the preparation which had been given to the dentist by the manufacturer especially for this purpose. This is purely empiric therapeutics and is wrong in its entirety. How much better it would be for the dentist to raise himself above the class of a dispenser of patent medicines to the class in which he belongs, an intelligent practitioner of an ethical profession. In the average practices, there are three major instances in which a prescription is indicated: as preoperative medication, in control of postoperative pain and in cases of hemorrhage. Of course, there are other instances, but these mentioned are in the majority.

Preoperative medication opens an avenue of treatment for the general practitioner through which he may render better service to his patients and in return have better patients to operate on. This type of medication is indicated in the case of the extremely nervous patient. The type of drug indicated here is the sedative. Time was when practically no drugs were available for this work except the bromids and chloral hydrate, which were given in small doses. In such cases, the hypnotic action of the drugs is not desired. With the strides that have been made in the pharmaceutic field, we now have many drugs available for this admirable service. The drugs which seem to be best suited for this type of medication are barbituric acid and related derivatives. Barbital introduced as veronal, phenobarbital introduced as luminal and soluble barbital are the most commonly used preparations. These three barbituric derivatives are official in the U. S. Pharmacopeia. Barbital is usually admin-

istered in 5 grain doses and is about as effective as chloral but not quite so prompt in action. It is less disagreeable to take and not so toxic. When it is administered orally about one hour previous to operation, admirable results may be expected. Phenobarbital is available for prescribing in tablets ranging from one-fourth to one and one-half grains and is also dispensed in the form of an elixir. It is more active and more toxic than barbital, but small doses are merely calming. This, too, should be administered about one hour previous to operation, in a three-fourths grain dose, since the one and one-half grain dose tends to produce a hypnotic effect. Soluble barbital has practically the same properties as has barbital except as far as the solubility of the drug may affect the rapidity of its action. The dose, 8 grains, may be administered similarly to the other drugs mentioned. Any of the drugs before mentioned may be used in cases in which they are indicated, but the important thing is that they should be prescribed and not dispensed. There is a great temptation, since such a small dosage is used, to hand a tablet to the patient with instruction as to taking it. This procedure will not create the confidence in you that giving a prescription will.

Perhaps, one of the most difficult conditions to control in the practice of dentistry is postoperative pain. Although in the medical profession, drugs are freely used for the control of pain, I seriously doubt that the pain controlled by the physician is any more severe than that sometimes following extraction. Some dentists treat the traumatized area locally and advise the patient to weather the storm, assuring him that the pain cannot last more than a day or two longer. How much better it would be if the dentist could and would prescribe some compound to relieve the patient during this period. Many times, physicians are called to the patient's home to alleviate suffering after the patient has been to the dentist. This is not a duty of the physician, but that of the man responsible for the pain. It would be a fine thing if every dentist who does extracting would have a narcotic permit allowing him to prescribe for his patients those drugs which are acknowledged to be the best agents for relieving suffering. For some reason, there seems to be a marked aversion on the part of dentists against narcotics; why it is difficult to understand, unless it is due to the fear of the habit forming tendencies of the drugs. This may be greatly discounted in dentistry since the period of time over which the pains exist is hardly sufficient, in the larger percentage of cases, to create any desire. Especially in their favor is the fact that they tend to create physiologic rest, which is important in any postoperative case.

Of the narcotic drugs, there are only two especially indicated in the control of postoperative pain: morphin sulphate and codein sulphate. Of the two, it has been my experience that codein is the better drug in the control of this type of pain as it has less side action than morphin, and hence its action is more limited to its intended use. Morphin produces the strongest narcotic, analgesic, hypnotic and intestinal effects and the weakest stimulation. It causes the greatest derangement of digestion and is more apt to induce addiction. Codein is less narcotic, less constipating and less apt to induce a habit or tolerance. For these reasons, codein is better adapted to dental uses. There are other drugs available for this service, such as the drugs discussed as sedatives, but administered in larger doses, and the drugs of coal tar derivation, such as acetphenetidin and acetanilid. These drugs exert such a strong

depressant action that their usage in many instances is contraindicated. Of the available drugs, one of the best combinations for the control of postoperative pain is embodied in the following prescription: codein sulphate, 3 grains, and acetylsalicylic acid, 18 grains, to make six capsules, one capsule to be taken as needed for pain.

Here, we have a combination of codein sulphate, with its narcotic action, and few side actions, together with the analgesic action of acetylsalicylic acid. As was stated, it is necessary for the dentist to have a narcotic license to prescribe this combination, but it is well worth while, in the terms of satisfied patients, and much better than dispensing small envelops of questionable compounds, as has been discussed in THE JOURNAL.

The third instance in which prescriptions are indicated for the general practitioner is in cases of hemorrhage. There are indications for preoperative medication and postoperative medication. In not a few instances, we have patients giving a history of excessive bleeding after extraction. This is not a true case of hemophilia, but simply one presenting difficulty in maintaining a normal clot. There are drugs indicated in these instances that will nicely control the situation, to the benefit of the patient, and certainly to the benefit of the dentist's frame of mind. The calcium salts have long been used in these cases, mainly calcium chlorid and calcium lactate. The former has a decided irritating action on the stomach and necessarily must be administered in intermittent doses of 8 grains. The latter does not possess this objectionable feature and may be administered freely in cases where it is indicated. The dosage for calcium lactate is 10 grains. It is available in 5 grain tablets, but because of its lack of solubility, the tablets are not the best form in which to prescribe it. It should be prescribed for a period of four or five days prior to the time of operation. In many instances in which it has been used to my knowledge, it has produced excellent results. It may be prescribed as follows: calcium lactate, 4 drams, and equal amounts of distilled water and simple elixir in quantity sufficient to make 3 ounces. This is shaken well and one teaspoonful taken every four hours.

As a postoperative treatment for hemorrhage, many times, local applications of thromboplastin substances (a clear exposition of fibrin ferment and thromboplastin substances can be found in New and Nonofficial Remedies, 1930, p. 181) or some of the iron salts may be used, although owing to the unsightly clots produced by the iron salts, this is not exceptionally good practice. In some instances, it is not possible to control hemorrhage entirely by this means and it is necessary to prescribe some compound for internal administration. Thromboplastin preparations lose their potency on standing.

For some unaccountable reason, the writing of a prescription is a bugbear to many dentists, when, as a matter of fact, it is decidedly a simple proposition. All that is necessary is a knowledge of the component parts of a prescription, of what we wish to prescribe and of the desired dosage, set down in regulation form, as follows: (1) the superscription (the heading and the name and address of the patient, the date and the sign "Rx"); (2) the inscription (the names of the ingredients and the quantities in which they are desired); (3) the subscription (the directions to the compounder or pharmacist, written in English or Latin and very often abbreviated); (4) the signa (directions by which the prescription should be taken, written out or

abbreviated, to be translated by the pharmacist and written on the label of the package); (5) name of prescriber.

No prescription should be issued without the signature of the prescriber and his degree. Also in the case of a narcotic prescription, the prescriber's registry number must be added.

One precaution which must be observed is in case of a liquid prescription. Never prescribe an amount which will not completely fill a bottle. This must be observed or the confidence of the patient in you or the pharmacist will be severely shaken. This precaution can be observed only by knowing the sizes of the ordinary bottles in the average drug store. They are 1, 2 and 4 drams and 1, 2, 3, 4, 6, 8, 16 and 32 ounce capacity.

There is one more precaution to be exercised: Never prescribe more of the remedy than is necessary during the present indisposition, as it is undesirable that the patient have a portion of the prescription left on hand to be used another time.

All prescriptions should be written as legibly as possible, since they must be read before they can be filled. Careful writing will obviate many mistakes, but in case of a mistake, the prescription is checked by the pharmacist and you may be called by him in regard to it. If you have made a mistake, accept the pharmacist's correction graciously because he has called as an aid to you and not with the idea of simply correcting you.

This discussion has touched the subject lightly. Its intention is to substitute "do's" for "don'ts."

DISCUSSION

J. S. Hopkins, Belair, Md.: Dr. Timmons deplores the use of "patent medicines" in dentistry, the reason for which he ascribes to the laxity of the dentist in keeping up with his profession. I believe that this is true, yet is it not also true that, as a profession, we are the most gullible group of human beings in Christendom? If we pause for a moment to think of how the profession is influenced by trade people, it is appalling. Think of the bulk of the library of many of our dentists being composed of trade journals. Think of the vast number of men following intensive psychologic business advertising who firmly believe—and I do not refer solely to the young man just out of school—that the lavish furnishing and equipment of our offices is much more important than scientific knowledge and professional skill. When such conditions exist, is it any wonder that we hand out "patent" medicines to our patients? Only a short time ago, I heard a prominent exodontist from one of our eastern cities say, when asked what he prescribed to control pain following extraction, "I give some of the samples that are sent me." A periodontist whom I saw giving a clinic recently, when asked the formula of some of the preparations he was using, could not tell what they contained. We should all constantly keep before us the importance of maintaining the highest standards of practice, for if we do not build our structure on a scientific basis, dentistry is sure to go backwards. I think that we are seeing the light, for dental education is advancing, and, on all sides, efforts are being made to place dental literature where it belongs. The writing of our prescriptions and the prescribing of those drugs whose physiologic action is perfectly familiar to us is always elevating, not only to the individual, but also to the profession. I hope that sometime in the near future, Dr. Timmons will go farther with the subject he has presented to us. He has, I think, covered the field pertaining to the extraction of teeth very well. There are, however, many other times when the dentist is called on to write a prescription about which he has left much to be said.

J. P. Buckley, Hollywood, Calif.: The title of the paper to which we have just listened is rather misleading. Instead of discussing dental medicine for the general practitioner as I understand it, Dr. Timmons has more nearly covered prescription writing or general medicine for the dental practitioner and has confined his discussion almost entirely to the prescription of such drugs as, in his judgment, are indicated and should be used in the treatment of the three, as he says, major instances in practice, to which he has called our attention: preoperative medication, control of

postoperative pain and in cases of hemorrhage. This was done, I take it, for the purpose of emphasizing the value of prescription writing in dentistry—an important thing for the dentist to know. The art of prescription writing is one that requires practice for its perfection, as well as a broad knowledge of drugs, their actions and their doses, and their indications for certain diseases. It is also essential to know the physical and chemical properties of drugs as related to the form of administration and possible combination with other substances. Through the development of the sciences of pathology and pharmacology, we have learned that it is unnecessary to exhaust our materia medica, or as the chemist of the A.D.A. has called it, our materia dentica, in prescribing for any one disease; and with this more definite knowledge of the action and effects of drugs on the diseased tissues, organs and functions of the body, we find that only a few agents can be employed with actual benefit in our endeavor to assist Nature in her efforts to restore an abnormal to a normal condition. Today, simplicity in prescriptions is evidence of a broad knowledge of the conditions to be met by the administration or application of drugs or remedies to the treatment of disease; and surely we are not asking too much when we expect the trained dental practitioner to possess this knowledge. It should be understood at the outset that there are three essential factors in all successful therapy: (1) to be able to recognize a pathologic condition and make a correct diagnosis; which means that the successful therapeutist must possess also a broad knowledge of general pathology and a special knowledge of dental or oral pathology; (2) to know what drug or remedy, if properly applied or administered, will reach the recognized pathologic condition and act the most favorably; which means that successful therapy depends on a broad knowledge of pharmacology, a science which treats of the action of drugs and remedies on the tissues, organs and functions of the body; and (3) to have at hand, in a convenient and practical form, that drug or remedy which experience has taught will best assist Nature in her efforts to overcome disease. In a recent address to the Los Angeles Chamber of Commerce, Merle Thorpe, edtior of *Nation's Business*, urged his auditors to encourage the growth of individualism. He pointed to the fact that the basis on which this country grew to what it is today was individual reward for individual merit. It is my judgment that this same statement could well be applied to the growth of our profession; and the medical phase, under discussion here, is no exception. Dr. Timmons has mentioned, rather disparagingly, "patent medicines." Some day, we must learn to differentiate, sharply and definitely, between a drug or remedy of scientific merit and therapeutic value, though protected by patent or trademark, and the large and ever-increasing list of secret formula preparations of unscientific and questionable composition and doubtful therapeutic worth. It was no doubt this latter group to which reference was made; for many of the drugs which Dr. Timmons highly recommends are protected by patent or trademark. The individual or firm who honestly and conscientiously seeks the truth and spends time and money to develop a drug or remedy of known value or proven worth should not be subjected to cricitism for protecting it by some means from the pirate or charlatan who, it seems, is always lurking just around the corner. It is estimated that 75 per cent of all procain (novocain) sold is used by dentists, and procain is or was a patented drug. The discoverers of insulin, for example, are pensioned by the Canadian Government for life, and until our country makes some such provision for the encouragement of our scientific investigators, it is not only poor taste but also wrong to criticize those who are laboring for the advancement of our profession and who, at the same time, must make some provision to live. Progress is the law of life, and he who does not plan for a modest surplus with which to provide for his family and protect himself in case of accident, premature loss of health or advancing age is neglecting one of the fundamental principles of organized society. I repeat, progress is the law of life; and scientific progress in the United States, under present conditions, must depend largely on individual reward for individual merit. I shall consider briefly the discussion of preoperative medication. It has been my experience that most patients who repose confidence in the operator are sensible and perfectly willing to stand some pain in having the necessary dental operations performed. My experience in attempting to lessen the nervousness of a patient by the internal administration of general sedatives has not been encouraging. Better results will be obtained in stimulating confidence by such means

as following a definite technic, using a true running engine, a sharp instrument with a steady hand—all this with the aid of the many local rather than general remedies at our command. As regards the control of postoperative pain following extractions or other surgery about the mouth, I seldom find it necessary to resort to the internal administration of narcotic drugs such as opium or its constituents—morphin and codein. The pain here can be controlled and stopped like magic by the local application of orthoform — another patented drug—in various combinations. For years, I have used and recommended for this purpose a remedy known as euroform paste, consisting of 40 parts orthoform and 60 parts europhen made into a paste by liquid petroleum. Applied directly to the sensory nerve endings of the wounded part, the orthoform stops the pain, the europhen stimulates the cells to healthy activity by the gradual liberation of iodin and the oleagineous vehicle protects the part from saliva and extraneous matter. Then, if it is deemed best to prescribe an internal remedy to produce sleep or quiet the nervous system, I would select one of the barbituric acid products rather than a true narcotic drug. They are compounded in convenient form by pharmaceutic chemists from drugs of known quality and their composition is definitely stated. There is no reason why a dentist should not prescribe morphin or codein on a proper narcotic blank, if, in his judgment, they are indicated in a given case. In my practice, I seldom, if ever, find it necessary to resort to their administration. Dentistry, like medicine and every other institution with a history, is endeavoring to find itself in a rapidly changing day, and we must join in the search or be engulfed in the whirlpool of advancement. It may be questioned by some as to whether dentists have the legal right to prescribe internal remedies. A large part of the services of the dentist is to treat diseases of the mouth and adjacent tissues, thus alleviating human suffering; and surely he is licensed to use any drug which he believes, from his knowledge and experience, will aid Nature in overcoming the pathologic condition. Like Dr. Timmons, I entered on the practice of dentistry through the gateway of pharmacy and it has been my experience, both as a pharmacist and as a dentist, that the right to prescribe drugs for any dental disease or condition will never be questioned if intelligence is evidenced in writing the prescription. In this relation, it should be mentioned that, at present, whiskey and brandy cannot be prescribed by dentists owing to a ruling of the Federal department having in charge the enforcement of the Volstead Act. Now that this matter has recently been transferred to the Department of Justice, where it rightfully belongs, it is only natural to anticipate a more favorable ruling for dentists, and at this meeting of the A.D.A. this particular matter is to be presented to the House of Delegates, with the end in view of legally permitting the dental practitioner to obtain a sufficient amount of whiskey or brandy for administering to his patients when indicated. It is generally recognized that these remedies are among the best and most convenient to use in many emergencies which arise almost daily in dental practice. When needed at all, they are needed at once and therefore should be at hand in the office. It is neither necessary nor desirable that the dentist have the legal right to prescribe these particular remedies; but to be deprived of their use unless they are obtained through illegal channels is absolutely wrong.

GIVING DENTAL PATIENTS A DIETARY FOUNDATION*

By HENRY F. HOFFMAN, D.D.S., Denver, Colo.

PROBABLY no other single subject is today receiving the attention on the part of the dental profession, particularly the orthodontist and periodonist, that is being accorded that of nutrition. After following the many theories as to the cause of caries, malocclusion and periodontal disease, we are now told with much assurance that all of these, as well as their many sequelae, are the direct result of malnutrition and that the cure is to be found only in establishing normal nutrition for the fetus, the developing child and the adult.

We have all seen, and mankind will always witness, a continuous procession of new theories and devices, only a few of which will withstand the acid test of time and increasing knowledge. Will this latest theory, that nutrition plays such a vital rôle in the well-being of humanity, prove all that its enthusiastic advocates claim for it, or will it turn out to be merely another fad?

To all of the theories so far advanced regarding the cause of the multiplicity of oral affections, malnutrition appears, in the light of our present knowledge, to be the most logical answer. Clinical evidence, the history of the effect of diet on different races and the conclusions of our research workers all point to the soundness of the theory of the importance of correct nutrition, but we should continue to view the subject with open minds until more conclusive knowledge is available.

Nutrition is now receiving such consideration by the dental profession that it occupies a conspicuous place in every dental meeting aspiring to present a comprehensive program.

These presentations, usually covering some phase of research with special reference to calcium and phosphorus metabolism, together with the conclusions of our research workers, have rapidly increased our fund of scientific knowledge until it is now considered an established fact that the diet of civilized man is sadly deficient in the factors required for bone and tooth building.

Naturally, possession of this knowledge has brought about an effort to correct this deficiency. The means employed to this end are either to correct the diet or to supply the deficient elements artificially, or to combine both these methods.

It is in the first of these, the correction of the diet, that I hope to interest you.

Artificial substitution of deficient elements may often be desirable and necessary, but substitution can seldom be maintained over a considerable period of time and is therefore at the best a temporary or emergency measure. Also there remains considerable doubt as to just how effectively the body can utilize minerals except as they are supplied in their natural food combinations. Our first

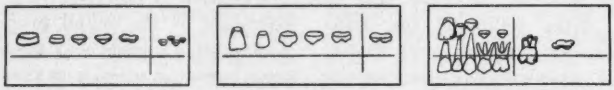
*Read before the Section on Orthodontia at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 24, 1930.

HOW TEETH GROW

Teeth are built principally from the minerals, calcium and phosphorus, which are supplied from the food we eat. A deficient supply of these minerals will result in weak teeth which will decay rapidly.

Teeth do not grow all over as apples or potatoes. They begin at the cutting edges and grow toward the roots.

Stages of Tooth Development*



25th week – prenatal life 20 deciduous teeth have started. 4 permanent molars are started.

40th week (at birth) Crowns of 24 teeth are well outlined.

6 years of age. Deciduous teeth all in place. 4 permanent teeth are erupted 24 other permanent teeth are forming.

*William J. Brady, D.D.S.

Figure 1.

FIVE CLASSES OF FOODS

To have health, the dietary must contain the required amounts, in suitable proportions, of the following five classes of foods.

CLASSES	FUNCTIONS	IDEAL SOURCES
PROTEINS.....	Build..... Repair	MILK, Meat, Fish, Legumes, Cottage Cheese, Eggs
CARBOHYDRATES..	Furnish heat..... and energy	MILK, Cereals, Bread, Fruit, Sugar, Potatoes
FATS.....	Furnish heat..... and energy	MILK, Butter, Cream, Vegetable Oils, Animal Fats
MINERAL SALTS.	Maintain life..... Build bone and teeth	MILK, Glandular Meat, Non-starchy Vegetables, Fruit
VITAMINS.....	Protect from..... disease	MILK, Fresh Fruit, Green Vegetables, Glandular Meat

Figure 2.

MILK

Milk contains protein, carbohydrates, fats, mineral salts, and vitamins; therefore, it is more nearly a complete food than any other single article.

Milk supplements and corrects deficiencies of other foods.

In pasteurization, (a protective measure against disease germs), Vitamin C is destroyed. This may be supplied by eating oranges, tomatoes, or other fresh fruits.

Milk is deficient in iron. This may be supplied by eating such vegetables and fruits as spinach or other greens, onions, tomatoes, and raisins.

Every child should have from a pint to a quart of milk every day. Every adult should have at least a pint of milk every day.

Figure 3.

THE PROTEINS

Fowl	Lean Meat	Nuts	Dried Beans
Fish	Cottage Cheese	Peanuts	Dried Peas

The proteins build and repair body tissues.

An excess of protein cannot be utilized or stored by the body. It is eliminated at the expense of the kidneys each day.

Glandular meats, such as sweet breads, kidney, brains, and liver, are a superior quality of meat protein.

Dried beans, peas, and peanuts, (the legumes) are proteins. They contain a large percentage of carbohydrate. Usually they are eaten in quantities beyond bodily requirements.

MEAT SUBSTITUTES: Cottage Cheese, nuts, eggs, or the legumes may be advantageously substituted for meat at the meat meal once or twice a week. They should not be used in any quantity in addition to meat at the same meal.

Figure 4.

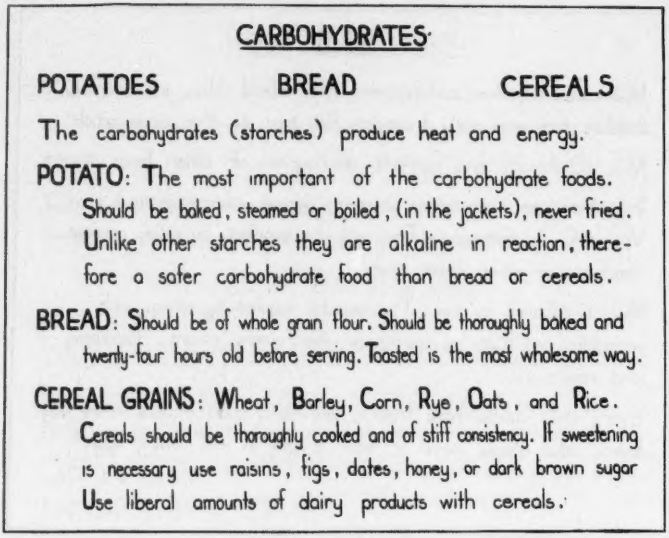

CARBOHYDRATES
POTATOES
BREAD
CEREALS
The carbohydrates (starches) produce heat and energy.
POTATO: The most important of the carbohydrate foods. Should be baked, steamed or boiled, (in the jackets), never fried. Unlike other starches they are alkaline in reaction, therefore a safer carbohydrate food than bread or cereals.
BREAD: Should be of whole grain flour. Should be thoroughly baked and twenty-four hours old before serving. Toasted is the most wholesome way.
CEREAL GRAINS: Wheat, Barley, Corn, Rye, Oats, and Rice. Cereals should be thoroughly cooked and of stiff consistency. If sweetening is necessary use raisins, figs, dates, honey, or dark brown sugar Use liberal amounts of dairy products with cereals.

Figure 5.

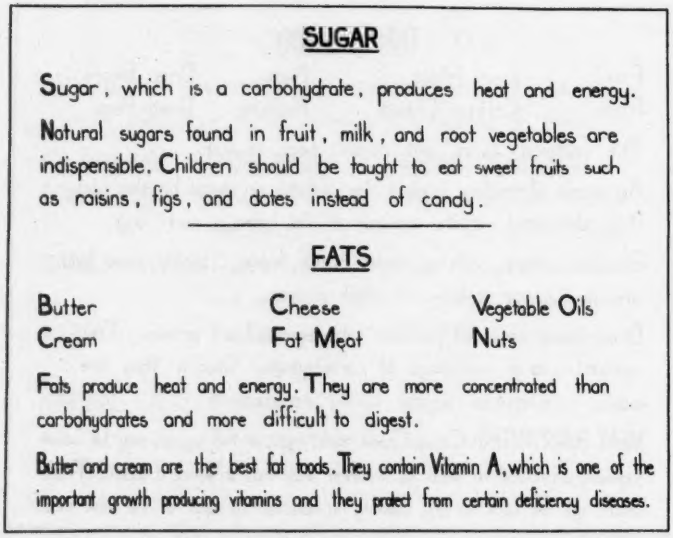

SUGAR
Sugar, which is a carbohydrate, produces heat and energy.
Natural sugars found in fruit, milk, and root vegetables are indispensible. Children should be taught to eat sweet fruits such as raisins, figs, and dates instead of candy.
FATS
Butter
Cream
Cheese
Fat Meat
Vegetable Oils
Nuts
Fats produce heat and energy. They are more concentrated than carbohydrates and more difficult to digest.
Butter and cream are the best fat foods. They contain Vitamin A, which is one of the important growth producing vitamins and they protect from certain deficiency diseases.

Figure 6.

serious efforts should, therefore, be directed toward correcting the diet, since there is no doubt about the efficiency of this method. To this end, I have prepared a guide (Figs. 1-14) so simple as to be easily understood, so brief as to be quickly read and so comprehensive as to classify all commonly used articles of food.

The last requirement, namely, to classify all commonly employed articles of food, is very important in that it makes possible an intelligent selection of a varied diet. Without this, one is confined to either a restricted or a monotonous menu or is exposed to dietary errors resulting from improper classification and combination of foods.

This step in improving the daily regimen having been accomplished, any special treatment which may be indicated can be instituted with greater probability of success and with the assurance that normal nutrition will be more nearly maintained after the special treatment has been discontinued.

This guide that I have mentioned is for a normal diet only. It is not offered for the treatment of pathologic conditions where organic involvement is present. Such conditions, when suspected, should be promptly referred to the physician; and, in all such cases, diets intended to remedy oral disease should be prescribed only in cooperation with the physician after a thorough physical examination. This is necessary to safeguard the patient's health and our own professional standing.

It should be regarded as entirely ethical, and the dentist's special duty, to disseminate knowledge of the requirements for normal diet for growth, building teeth and maintenance of health.

To secure the necessary information by a perusal of the literature on this subject and to arrange this information in usable form is obviously a discouraging undertaking. To overcome this difficulty is the object of this normal diet guide, and, in its preparation, only accepted principles have been utilized, fads and practices of doubtful value being avoided.

You can talk for hours to a patient about dietary necessities, but unless he receives a mental picture from that information, he cannot go home and put it into practice. This normal diet guide is designed to overcome this difficulty, and a digest of the information printed on a card, of convenient size for daily reference, is given the patient to take home.

The first step to be taken with the patient should be to secure a case history (Fig. 15). This forms the basis upon which to suggest corrections of the diet, and of health habits which are interfering with the proper utilization of food. It also serves for the accumulation of valuable information for statistical use.

Most of this information can be secured by the dental hygienist or a competent assistant and thus the dentist be relieved of an unnecessary expenditure of time. Furthermore, a competent woman will usually secure more intimate details than the dentist. It is always better to have both the mother and the child present when the history is being taken, as the information given will be much more accurate.

The diet of the patient, as revealed by the case history, is compared with the dietary needs of the body for growth and maintenance. This will indicate those things which should be eliminated, and will show in what way the diet is deficient. Then, special emphasis should be placed on the need for building teeth and the time at which teeth are developed. Although teeth may be built at but one

MINERAL SALTS

The mineral salts are necessary for maintenance of life. Calcium and phosphorus are especially important for tooth and bone building.

The average diet is deficient in calcium and other mineral needs of the body.

Mineral salts are found principally in milk, fruit, glandular meats, and non-starchy vegetables.

NON-STARCHY VEGETABLES

Besides supplying an abundance of the mineral salts, this should furnish much of the necessary roughage of a meal. They may be combined with any other foods.

Cabbage	Parsnips	Green Corn	Summer Squash
Beets	Lettuce	Pumpkin	Garlic
Onions	Fresh Green Peas	French Artichokes	Rutabagas
Carrots	Celery	Brussels Sprouts	Beet Tops
Fresh Green Beans	Turnip Tops	Turnips	Squash
Dandelion Greens	Cauliflower	Egg Plant	Swiss Chard
Spinach	Asparagus	Sweet Peppers	Water Cress

Figure 7.

VITAMINS

VITAMINS are present in foods grown in the sunlight, in dairy products, codliver oil, and glandular meat. They are absolutely necessary to health.

VITAMINS	IDEAL SOURCES	FUNCTIONS
A	Whole milk, Butter, ... Green Leafy Vegetables, Egg Yolk, Liver	Prevents an eye disease called Xerophthalmia.
B	Milk, Yeast, Eggs, ... Whole Grain Cereals, Non-starchy Vegetables	Stimulates appetite and growth. Prevents certain nervous diseases.
C	Unpasteurized Milk, Fresh Fruits... (particularly citrus fruits), Raw Vegetables	Prevents Scurvy and certain gum diseases.
D	Codliver Oil, Direct Sunlight, ... Ultraviolet Light	Prevents Rickets. Stimulates tooth and bone development.
E	Milk, Whole Wheat, Green Leaves.	Prevents sterility.

Figure 8.

FRESH FRUIT

Fruit is not a luxury, but a vital necessity in the diet.

It contains an abundance of mineral salts, natural sugar, and vitamins.

Nearly all fruits are alkaline reaction and should, each day, furnish part of the roughage necessary to elimination.

Lemons	Huckleberries	Gooseberries	Pears
Oranges	Blueberries	Elderberries	Loganberries
Tomatoes	Peaches	Grapes	Blackberries
Grapefruit	Strawberries	Bananas	Cherries
Pineapple	Plums	Raspberries	Figs
Limes	Apples	Prunes	Currants
Cranberries	Apricots	Mulberries	Dates

DRIED FRUIT

Dried fruit is to be used as a substitute when fresh fruit is not available or when fresh fruit is prohibitive in price.

Figure 9.

CONSTRUCTING THE DIETARY

In planning meals it is very important to have **EACH DAY** a variety containing sufficient quantities of the five classes of foods listed on **Chart 3.**

All meals should be substantial for growing children, underweight people, and those doing work requiring physical exertion. Those exercising little or doing sedentary work require much less of the carbohydrate, protein, and fat foods.

Basis for substantial meals:

BREAKFAST: Milk; whole grain cereal, preferably cooked; glass of orange juice, or other fruit; egg, if desired; bacon, if desired.

LUNCH: Milk; two starches; non-starchy vegetables, cooked or raw; and fruit or simple dessert.

DINNER: One protein, not more than one starch (preferably potato), two cooked non-starchy vegetables, one substantial salad of raw vegetables or fruit, and milk for growing children.

Figure 10.

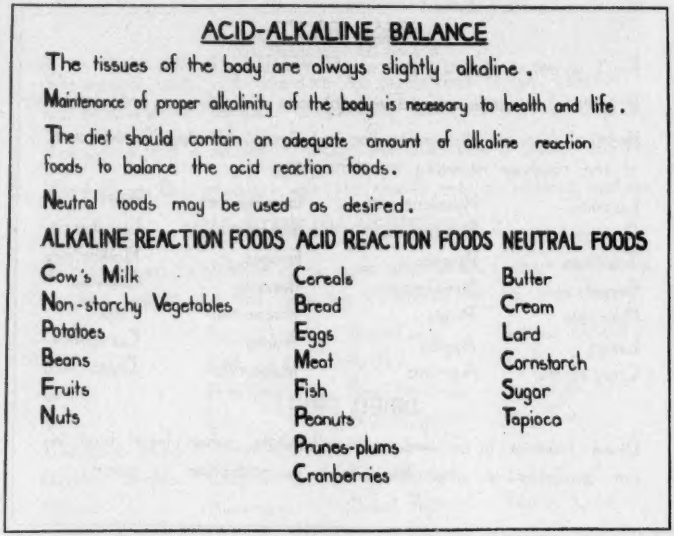


Figure 11.

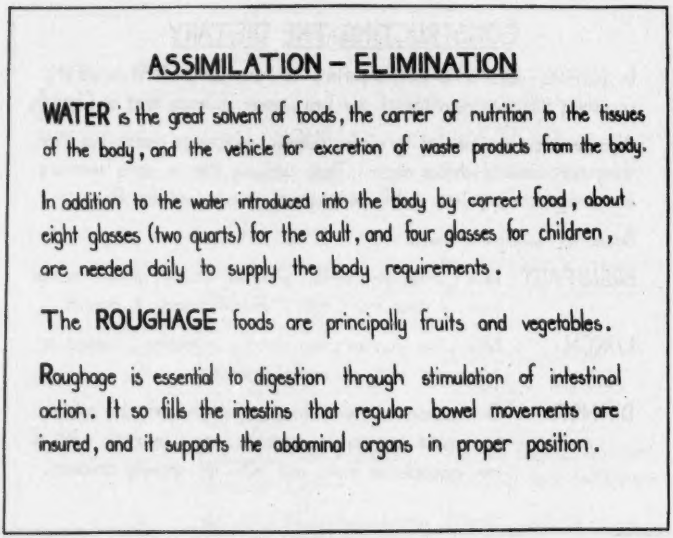

ASSIMILATION – ELIMINATION
WATER is the great solvent of foods, the carrier of nutrition to the tissues of the body, and the vehicle for excretion of waste products from the body.
In addition to the water introduced into the body by correct food, about eight glasses (two quarts) for the adult, and four glasses for children, are needed daily to supply the body requirements.
The ROUGHAGE foods are principally fruits and vegetables.
Roughage is essential to digestion through stimulation of intestinal action. It so fills the intestins that regular bowel movements are insured, and it supports the abdominal organs in proper position.

Figure 12.

time, correct nutrition is a vital factor in their protection and in maintaining the health of the periodontal tissues.

The orthodontist, for successful orthodontic treatment and retention, has need to put emphasis on all the nutritional requirements of the body. It is not sufficient to stress the calcium and phosphorus needs, for normal bone and tooth development accompany only normal nutrition of the entire body.

Following is the nutrition report of two cases, both of considerable concern until careful case histories were taken.

I am using these two not only because of their radical difference but also because the findings in each case were quite different from what we had expected them to be, thus demanding an entire change in the subsequent treatment.

CASE REPORTS

Case 1.—C. B. gave evidence of anemia, having a colorless complexion and skin eruptions and showing a lack of energy. Aside from a deficiency of calcium and phosphorus, her diet did not account for her anemic appearance. The fact was also revealed that she had recently been under the care of a physician.

As we were unsuccessful in having the mother call at the office, I consulted the physician and learned that the patient had a heart leakage and a kidney complication which had not been checked up for some time. She was therefore referred back to the physician, who regulated her diet more carefully, with special reference to calcium and phosphorus. She is gaining rapidly in weight and energy and the case has ceased to be of special concern to me. (Fig. 16.)

Case 2.—B. M., a child of luxury and overindulgence, showed every evidence of early and rapid decay of the teeth. The mucous membranes were slightly inflamed and the membranes on the inside of the upper and lower lips often showed large raw, bleeding and slightly ulcerated areas. The patient was referred to the physician without result. She showed symptoms of appendicitis. Efforts to correct the diet were unavailing.

Her family thought the abrasions of her lips were due to biting induced by nervousness resulting from the appliances. I thought it from irritation of the tissues from malnutrition. The orthodontic appliances were removed without marked effect.

We then went into the case history and found a calcium and phosphorus deficiency, too many sweets and not enough roughage. The one thing in her diet which made it at all adequate was a fair amount of milk.

Our conclusion as far as the lip condition and the nervousness were concerned was arrived at in an analysis of her health habits. The chief source of her nervousness was the two or three exciting picture shows which she attended every week. (Fig. 17.)

Although we had devoted more than the usual time and thought to these cases, in neither was the real difficulty even guessed until careful case histories were made.

In both cases, patient and orthodontist stood to lose much of the benefit of orthodontic treatment unless the trouble was discovered and corrected.

These are the reasons and justification for the dentist, the orthodontist, and the periodontist to delve into the subject of health and nutrition, devoting time, energy and even money to improving the nutrition of their patients. If nutrition is an important factor in dental health, nutritional education is an important part of dentistry. All dentists cannot be research workers, but they can learn to put into effective practice the findings of more scientific observers.

DISCUSSION

Orcella Rexford, San Francisco, Calif.: Being a dietitian of two of three years' experience, I am very much interested in these papers being presented by the dentists. Physicians and dentists are studying diet along just one particular line, and are overlooking an important phase which, I feel, will help solve the problem much better than by simply concentrating on proteins and carbohydrates, that method which has been used for about twenty or twenty-five years. We who are

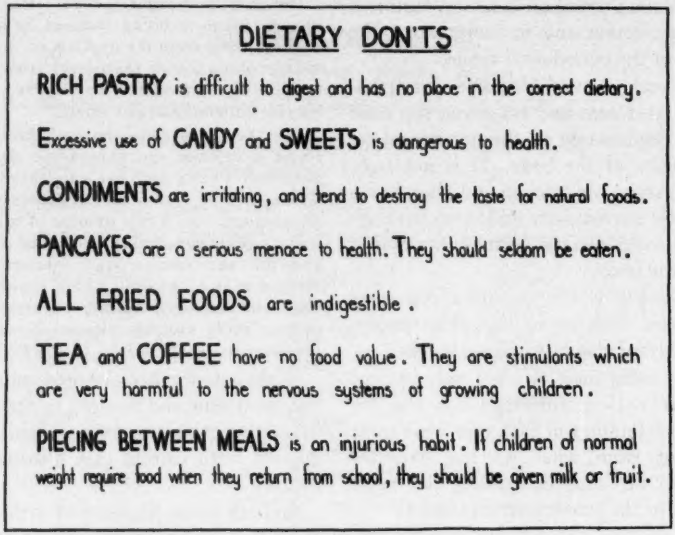

DIETARY DON'TS
RICH PASTRY is difficult to digest and has no place in the correct dietary.
Excessive use of CANDY and SWEETS is dangerous to health.
CONDIMENTS are irritating, and tend to destroy the taste for natural foods.
PANCAKES are a serious menace to health. They should seldom be eaten.
ALL FRIED FOODS are indigestible.
TEA and COFFEE have no food value. They are stimulants which are very harmful to the nervous systems of growing children.
PIECING BETWEEN MEALS is an injurious habit. If children of normal weight require food when they return from school, they should be given milk or fruit.

Figure 13.

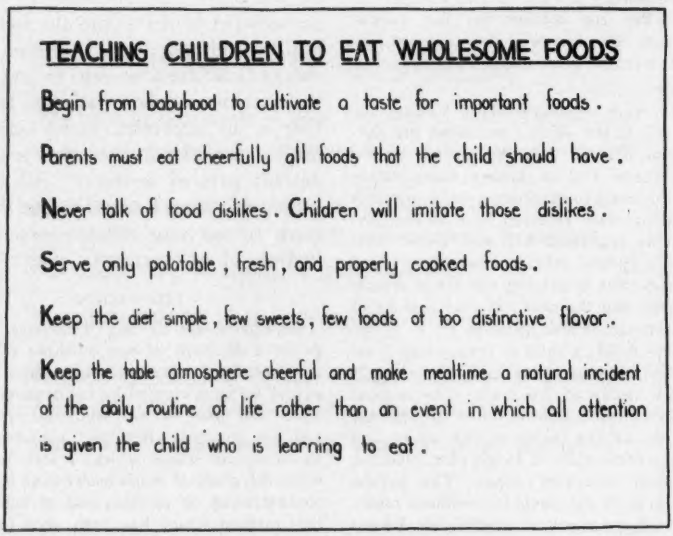
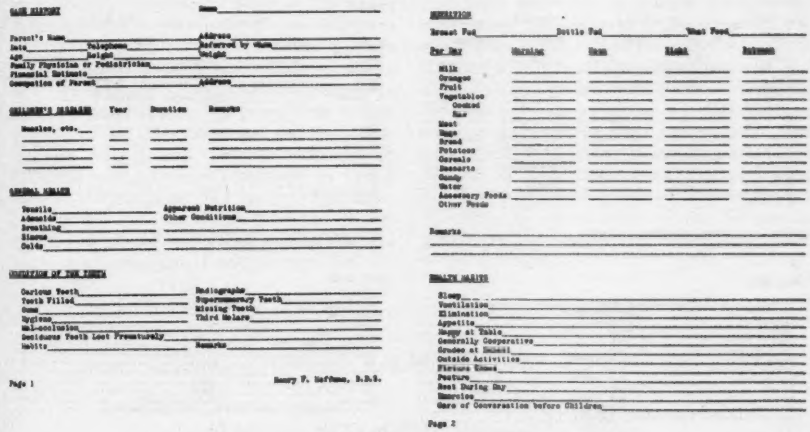

TEACHING CHILDREN TO EAT WHOLESOME FOODS
Begin from babyhood to cultivate a taste for important foods.
Parents must eat cheerfully all foods that the child should have.
Never talk of food dislikes. Children will imitate those dislikes.
Serve only palatable, fresh, and properly cooked foods.
Keep the diet simple, few sweets, few foods of too distinctive flavor.
Keep the table atmosphere cheerful and make mealtime a natural incident of the daily routine of life rather than an event in which all attention is given the child who is learning to eat.

Figure 14.

specializing in this particular field find today that all people cannot be dealt with alike. It is impossible to give every child milk, or to give every adult milk. Milk today is pasteurized, and it is very indigestible to some people. It forms heavy curds in the stomach, the child's stomach is unable to break up these curds, and serious dietary upsets result. Many children can take goat's milk who cannot take cow's milk. Our milk supply today is very questionable, and we should hesitate to advocate feeding milk to everybody. We find about ninety-three different types of blood chemically considered, and we have a starvation at times which will cause serious trouble. As the wife of a dentist, I am much interested in this particular angle enough phosphorus and calcium in food, they will have a breakdown of the tooth structure.

Sherman L .Davis, Indianapolis, Ind.: We have applied these principles as best we could in delayed dentition, when the tooth was fifteen months or more over the average time of eruption. We find certain conditions in practically every child that are abnormal, and a failure has not yet been recorded from correcting those conditions, as far as I know. Eruptions take place within three months to, I think, eighteen months.

Weston A. Price, Cleveland, Ohio: I always consider nutrition in connection with deformities of the body, this being one of the most important problems with which we are confronted. I would like to express one


CASE HISTORY

Name

Parent's Name — Address
Date — Telephone — Referred by whom
Age — Height — Weight
Family Physician or Pediatrician
Financial Estimate
Occupation of Parent — Address

CHILDREN'S DISEASES — Year — Duration — Remarks

Measles, etc.

GENERAL ANALYSIS

Vaccin — Apparent Nutrition
Adenoids — Other Conditions
Breathing
Sinuses
Colds

CONDITION OF THE TEETH

Carious Teeth — Radiographs
Teeth Filled — Supernumerary Teeth
Gums — Missing Teeth
Hygiene — Third Molars
Mal-occlusion
Deciduous Teeth Lost Prematurely
Habits — Remarks

Page 1 — Henry F. Hoffman, D.D.S.

NUTRITION

Breast Fed — Bottle Fed — When Fed

Per Day	Morning	Noon	Night	Between
Milk				
Oranges				
Fruit				
Vegetables				
Cooked				
Raw				
Meat				
Eggs				
Bread				
Potatoes				
Cereals				
Desserts				
Candy				
Water				
Accessory Foods				
Other Foods				

Remarks

HEALTH HABITS

Sleep
Ventilation
Elimination
Appetite
Happy at Table
Generally Cooperative
Grudge at School
Outside Activities
Picture Books
Posture
Rest During Day
Exercise
Care of Conversation before Children

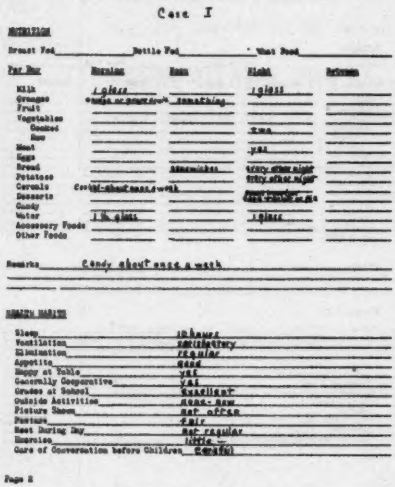
Page 2

Figure 15.

of the subject. A lack of potassium in the body will cause dental caries. Also, we find that most children are deficient in phosphorus. The average diet as laid down is deficient in phosphorus and calcium. The food that we give the child every day must have all of the sixteen elements in it. Every person must ingest sixteen chemical elements every day, if not more. I was an invalid all my life until I took up this study of balancing the food. Today, I enjoy perfect health. I have perfect teeth, whereas heretofore I had been in the dental chair once a month. Dentists who are working along this line should study biochemistry. If the person does not get

word of warning: Let us not have the idea that milk always has the same food value and that vegetables of a certain name are always similar. In my analysis of different plant foods, I have found variations of many hundred per cent in the amount of minerals in certain foods. Let us, for example, take one point not mentioned here today, because it was taken for granted that the child must use whole wheat bread. Let us suppose the child needs iron, and let us study for the moment the difference in iron in wheat in different parts of the country. In my study of the same seed wheat grown in twenty places, the iron content varied fifteen fold. Varia-

tion in the mineral content of animal foods not only influences but also controls many developmental and health conditions. This even amounts to the stunting of the growth of grazing animals. This problem has become very acute in certain districts in many countries throughout the world. We have not appreciated that only a small part of the mineral content of the soil may be in a chemical form available for plants. Some of the essential minerals are chemically bound, and often only a small percentage of the total present can be utilized, since plants use only the water-soluble binary compounds. The disintegration of the soil to make chemicals available even where they are present in



Case I

NUTRITION

Breast Fed_____ Bottle Fed_____ What Food_____

Per Day	Morning	Noon	Night	Between
Milk	1 glass		1 glass	
Oranges				
Fruit				
Vegetables				
Cooked				
Raw				
Meat				
Eggs				
Bread				
Potatoes				
Cereals				
Desserts				
Candy				
Water				
Accessory Foods				
Other Foods				

Remarks Candy about once a week

HEALTH HABITS

Sleep	10 hours
Ventilation	satisfactory
Elimination	regular
Appetite	good
Happy at Table	yes
Generally Cooperative	yes
Grades at School	Excellent
Outside Activities	None now
Picture Shows	not often
Posture	fair
Rest During Day	not regular
Exercise	little
Care of Conversation before Children	Careful

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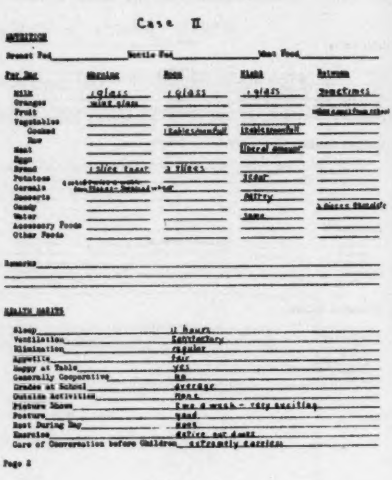
Figure 16.



Case II

NUTRITION

Breast Fed_____ Bottle Fed_____ What Food_____

Per Day	Morning	Noon	Night	Between
Milk	1 glass	1 glass	1 glass	
Oranges				
Fruit				
Vegetables				
Cooked				
Raw				
Meat				
Eggs				
Bread				
Potatoes				
Cereals				
Desserts				
Candy				
Water				
Accessory Foods				
Other Foods				

Remarks

HEALTH HABITS

Sleep	11 hours
Ventilation	Satisfactory
Elimination	regular
Appetite	fair
Happy at Table	yes
Generally Cooperative	no
Grades at School	average
Outside Activities	None
Picture Shows	One a week - very exciting
Posture	good
Rest During Day	None
Exercise	active out doors
Care of Conversation before Children	extremely careless

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Figure 17.

bound form is a very slow process and the soluble factors may be rapidly leeched out. In many districts, the total available phosphorus in the soil is not sufficient for fifty crops and sometimes not half that many. Accordingly, tens of thousands of square miles that a few years ago were able to support large populations and cattle industries cannot now do so. The available minerals have been shipped off the lands in the form of animal and plant foods, as grasses and grains for meat products. These often go to foreign countries. A large percentage of the commerce of the land and sea consists of the removing of these chemicals in the form of foods. In one state alone, it is reported that there are 8,000 square miles in which cattle have developed bone changes characterized by abnormal enlargement of the head. But our problem is not limited to depleting the minerals in foods: it often has its chief expression in changing amounts of certain chemical activities, some of which are the known vitamins. The problem that Dr. Hoffman has discussed dealing with facial development, abnormal positions of the teeth and conditions governing growth urge for the bones of the face is directly related to mineral and vitamin metabolism. The most important problem that is facing not only the Section on Orthodontia, but also the whole dental profession today, is not primarily the mineral problem, great as it is, but concerns the depletion of the vitamins which are produced in plant life and which can be developed only when certain minerals are present in proper amounts. One of the greatest problems of child life today, in my judgment, is the difficulty in obtaining milk that is sufficiently high in vitamins. We human beings have little capacity for selecting foods on the basis of vitamin content. When I put three grades of butter on the basis of vitamin content before chickens, they will eat twice as much of

the high vitamin butter as the low and thus maintain health and life. The high vitamin butter that they select will not only make it possible for them to utilize the minerals in the foods they are given, but will also, as I have shown, prevent dental caries in the teeth of human beings of all ages. Our orthodontic problems are inseparably related in all their phases to mineral and vitamin nutrition.

Dr. Hoffman: The intent of this paper, and the diet charts accompanying it is to disseminate knowledge to dental patients, in a form easily and quickly grasped, of the basis for a diet which will insure normal nutrition. It is not the purpose of this paper to take up any discussion of the subject of biochemistry or any of the complicated points of nutrition. The subject of idiocyncrasies in diet has been mentioned in discussion. Most of the lower animals under favorable conditions live on a certain diet, keep healthy, reproduce and develop no idiosyncrasies, while the human race develops many. This may be the result of an improper or deficient diet taken over a long period of time. Dr. Price spoke of the variations in the nutrient qualities of foodstuffs produced under varying conditions as to soil content and sunlight. We know these variations exist. Food products produced in deficient soil or without sufficient sunlight are not so nearly complete foods as when they are produced in the presence of all necessary conditions. They lack something, just as our teeth lack something when they have not had the proper food.

Georges Villain, Paris, France: The question of diet is most important in the practice of orthodontia. Physiology is also something important, as directly connected with the question of diet. There is the chemical phase of the diet, and also the makeup of the diet; and if we see the arch and the position of the teeth change to a great extent, we must think that there is some change in the conditions present. A child that uses only soft food will not develop in muscular action, and a change in shape, first, of the arch, and then in the position of the teeth occurs. And we should be very careful that the diet contains the chemicals necessary to human beings. We must study the forces of muscular action. If the motion of the jaw varies from normal the arch will be shaped in accordance with the principal motions the child makes. When the child brought up on rather soft food reaches 19, the arch will be long and narrow, and that shape will persist if we do not change the diet or even other conditions of living. The child must accommodate himself to the character of the country or the climate in which he lives and to the kind of food which he must live on.

ORAL DIAGNOSIS*

By ELMER S. BEST, D.D.S., Minneapolis, Minn.

THERE will be two subjects discussed in this paper which have an obvious tie-up with oral diagnosis. First, I shall discuss the subject of the elimination of pain in dentistry. This will be viewed by those present from two angles. One group will see in it a great opportunity to improve dental service and, further, an opportunity to add greatly to the comfort and happiness of their patients. The other group will look beyond and see in it a most unusual opportunity greatly to increase their practice.

The other idea which will be presented will be in that "No Man's Land," between the medical and dental professions:

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 22, 1930.

when to extract teeth. "No Man's Land" is now converted into the site for a peace council from which will emanate practical and sensible ideas from both the medical and the dental profession which will solve many of the problems that have bothered both of them, and, as a result of which, patients have not, in the past, received the services to which they were entitled.

ELIMINATION OF PAIN

Pain is mental and physical. Patients have on occasions without number remarked that the fear of having their teeth worked on caused them more pain than the actual operative work. We, therefore, have the mental as well as the physical to deal with. The dentist who fails to recognize this and act accordingly will fall far short of his possible accomplishments.

Young patients, we frequently find, on their first visit, come to the office so frightened and nervous as to make it impossible to do anything for them. What is back of all this? Someone has been talking about something in connection with dentistry that put fear in the minds of these children. What was it? What, in the minds of the laity, is still today the outstanding thing in connection with the practice of dentistry? Nothing more or less than pain. They think, talk, feel and act "pain" in connection with dentistry. For certain reasons, any and all of which are without sense, they convey this idea to children. To what extent are dentists responsible for this situation? They are directly responsible and cannot escape their responsibility in solving it.

The new little patient, on the occasion of his first visit to the dentist, is invariably accompanied by mother, father or nurse, who proceeds to demonstrate to the dentist that he or she thoroughly understands or misunderstands (this depending on the point of view) the education of children by saying, "Now, sit right up in the chair; the doctor isn't going to hurt you." Right away, the idea of fear of pain is literally forced on the mind of the child by a kind but thoughtless person.

So much damage in this way is done by parents that many dentists prefer that they absent themselves from the operative rooms as quickly as possible. One friend of mine has a sign in his waiting room, "Parents not allowed in the operating room with children."

One of the first things to be accomplished in the control of pain is to practice a type of dentistry for children which requires the absolute minimum of pain and discomfort. How is this brought about? Begin early. Have the children in each two months for prophylaxis and any small fillings that may be necessary in the deciduous teeth. To prevent involvement of the pulps with the inevitable accompanying pain, be sure that the mother or nurse understands brushing and the use of the silk floss in keeping the proximal surfaces clean and free from decomposed food. In order to make sure that this is being done and that cavities are not developing on these surfaces, interproximal roentgenography as advocated by Howard R. Raper should be carried out for these patients. To assist further in preventing pulp irritation and possible loss due to caries developing, the parent or nurse should be continually reminded of the proper diet for young children and keep constantly before them the danger of overindulgence in sweets. If a young child is started out along these lines, he positively swears by the dentist and any thought of fear of him and his work is entirely removed from his mind. Pain no longer enters the picture.

In adults, very much the same conditions prevail. A large percentage of patients remain away from the dentist because they dread the pain incident to having work done. This dread is eliminated in a very large measure by having the patients on a regular three months prophylaxis call list. In this way, cavities just beginning are discovered. One of the greatest aids in this is a full mouth roentgen-ray examination each year. In a very short time, it will be found that instead of staying away from the dentist when they feel something has gone wrong with their teeth, they go at once to see what has happened. They do not then think of their visit to the dentist in terms of pain. This interesting relation between patient and dentist removes in a large measure that mental pain that countless thousands feel when they contemplate a visit to the dentist.

And now we come to actual physical pain in connection with the teeth and their supporting structures and in connection with surgical work involved in operating. I have long felt that a dentist has no more right to ask a patient to submit to the pain and annoyance of operating on sensitive tissues without proper precautions being taken to relieve it than the general surgeon has to do his work and allow the patient to suffer and make no attempt to relieve him. This, then, means that, in cavity preparation and in the preparation for full and partial veneer crowns, the work should be done under a local anesthetic. The various types of injection have now been so simplified that anyone can easily master them. With the method now largely in use where reliable manufacturers prepare their anesthetics in glass containers for use in hypodermic syringes, the handling of local anesthesia is greatly simplified. A suggestion is here made that when a number of cavities are to be prepared on one quarter (molar to central region), the patient be given at least a two-hour appointment so that, with the area anesthetized, a great many cavities can be prepared.

While the control of pain is nicely secured in this type of work, great caution must be exercised that the tooth in cavity preparation is not overheated, with resulting injury to the pulp and with pain caused later on. In making even the injection itself practically painless, a pellet of cotton dipped in cresatin is placed on the mucous membrane at the point of injection for a few seconds. If local anesthetics were used in setting inlays, crowns and bridges, in addition to cavity preparation, the benefit would be felt by the dentist as well as by the patient.

It is common experience that after cavities have been prepared and sealed, the stopping loosens and becomes dislodged, which leaves an open cavity, and this, being extremely sensitive, not only causes the patient constant pain until the stopping is replaced, but also may be the cause of a serious irritation (bacterial as well as thermal) to the pulp. In experimenting with stoppings, it has been found that "creo stop" with its accompanying "creo-seal," not only makes a combination which it is practically impossible to dislodge, but also reduces quite materially the sensitiveness found in these cavities when the cement is placed in them incident to setting inlays.

We have patients who, in spite of the fact that they feel that everything possible is being done for their comfort, experience a wave of fear and find themselves in a state of great nervous tension when they come into the waiting room, which makes them very difficult to work for. In these cases, if a sedative is given fifteen minutes before operating, it will be found that they are quite relaxed.

And now we have another group to consider and they are very numerous: the patients who, though they realize that everything we can do to prevent pain is being done, become almost rigid and hold the breath the minute a bur revolving in the engine touches a tooth. On this group, I have spent more time and thought than on all the others combined.

On questioning many of these patients, it was learned that the thing that bothered them was the fact that when they opened the mouth and the dentist began cutting, they felt that they might be terribly hurt and that they had no way of stopping it. They were willingly or unwillingly at his mercy. In fact, if they tried to speak to the dentist the tongue would get caught and they would be seriously injured. They uniformly agreed that if they had some means at their disposal whereby they could only stop the engine if they wanted to, it would help them greatly.

I therefore had constructed a stop switch connected with the engine and fastened it into the left arm of the chair. The patient holds this little pendant switch in his hand, and if he feels that he is going to be hurt or is actually being hurt, he presses the switch and shuts off the motor. They say repeatedly, "You give us an even break now."

At first thought, one is inclined to feel that such an arrangement would interfere greatly with the progress of the work because the patient would be constantly stopping the engine. As a matter of fact, the reverse is true. After they see it really works, they seldom use it, and remain quite contented. Some patients just touch the button with a slight pressure of the thumb, when the minute cessation of electrical current is felt in the handpiece, and the bur is moved to another location.

Another cause of great distress to the patient is acute traumatic occlusion. This may occur owing to a recent shifting of the cuspal relation due to loss of a tooth, or it may occur in the case of an inlay, especially if made of one of the very hard golds, which has been set with considerable pressure. The patient complains of a severe pain in a certain region but often is unable to locate it in any one tooth. When you ask him to close slowly he will move the mandible a little to one side, or back or forward, and will not register in a position that might cause pain as he has trained himself to avoid this exact relation.

With a carbon paper between the teeth, the patient is instructed to "chop," and will close several times in normal relation. It may be necessary to assist him by taking hold of the chin and raising and lowering it several times, each time bringing the teeth together in centric occlusion. With the carbon paper, the spots will be seen on the occlusal surfaces. These cuspal levels are so reshaped that the occlusal stress is relieved. In most cases of a combined pericementitis and pulpal hyperemia, as a general rule relief will follow. If you question the advisability of using methods of controlling pain, ask any one who uses them in his practice if it is worth while.

WHEN TO EXTRACT TEETH

Having surveyed the literature on the subject in a fairly thorough manner, I made one interesting discovery which verified something recently written on the subject: "If you want to believe, for instance, that all pulpless teeth should be extracted, you will find in the literature abundant evidence to support your belief. If, on the other hand, you believe it is safe to save some of them, you will find that a review of dental literature affords

you just as much comfort in sustaining your views on the subject." The one that is the most convincing is generally he who has had the last word. Hence it pays to keep your reading up to date. From a review of the literature and from personal inquiry, it was found that chaos resolved itself into more chaos and that order had taken wings and left for more congenial company. It remained, therefore, to sit down and write what an experience of twenty-four years in dental practice had taught me on this particular subject.

When to Extract a Tooth.—There are seven different classes of teeth that call for such a consideration: 1. Retained deciduous teeth. By this is meant deciduous teeth which have been retained in the arch for some time after the period when they should have been lost. 2. Malalined teeth in adults, teeth which destroy the esthetic appearance, correction meaning either removal or realinement. 3. Teeth showing an involved pulp: (a) deciduous teeth, which as a general rule have their pulps exposed through advanced caries; (b) permanent teeth, that large class of teeth the disposal of which has caused more controversy than any other single thing in all the history of dentistry.

4. Teeth involved with periodontoclasia, and we know how common they are. They are the teeth referred to when the patient says, "Can you cure pyorrhea?"

5. Teeth, in many instances vital, having parietal abscesses. Their presence causes us much concern, and in considering their disposition we are frequently at a loss for some time to know just what decision to make. 6. Teeth which interfere with a satisfactory plan of reconstruction. Most of them, in themselves, show no cause for their removal. They are simply in the way. 7. Submerged or impacted teeth, including all such teeth that cannot be brought into proper alinement.

In making a decision as regards pulp involved deciduous teeth, pulp involved permanent teeth, teeth involved with periodontoclasia, and teeth with parietal abscesses (Group 1), we find ourselves confronted with a problem to which we must give consideration: the patient's physical condition; and when I speak of the patient's physical condition, I am speaking of something outside the field of the dentist. The physician is the one to determine the general physical condition of the patient and should be consulted in the matter. Strange as it may seem, the problem of the physician's point of view and the dentist's point of view, instead of being a stumbling block to progress, is the very thing that makes satisfactory progress possible.

When the dentist demonstrates to his medical confrères that he has the same breadth of understanding that they have and that he is not entirely interested in mechanics, there is little trouble in arriving at a common understanding. He must keep in mind the fact that the physician is the guardian of the patient's health in a broad way, and that his responsibility overlaps that of the dentist. No one more than the physician realizes the uncertainties of medical practice, and he welcomes all the assistance that he can get. When he realizes that the dentist and he talk the same language, so to speak, a fine spirit of cooperation is generally established.

If the dentist is arbitrary and tends to be dictatorial, he is, as he should realize, endangering the patient's interests. For instance, if he takes the attitude that the problem involved is purely a dental one, that in all cases all pulpless teeth should be removed regardless of anything and

everything, the physician may regard him as considerably biased.

Again, if he holds that there can be no relation between the patient's general health and the teeth, he is liable to be looked on as considerably behind the times. The dentist should be well posted in bacteriology, oral anatomy, pathology, immunology and histology, as far as the mouth and adjacent structures are concerned, in order that he may discuss these things intelligently with the physician. It must not be inferred from this that all physicians are held to have the same qualifications for determining what patients are well and what are sick. They most certainly have not, and if the patient happens to have a poorly qualified physician, the patient is in hard luck. All the dentist can do is the best that he can under the circumstances.

In all cases of this type discussed by physician and dentist, an answer to the question, "Does the patient's physical condition warrant the retention of pulpless teeth?" should be found. Always keep in mind that there is an element of uncertainty about it. It is extremely difficult to determine without extraction whether pulpless teeth are a factor in any physical disturbance that a patient may have now or in the future.

There are those in the dental profession who claim that on account of the uncertainty surrounding pulpless teeth, they should all be removed. Allow me to ask those who so believe, what in their work are they certain of? What is there in dentistry that is positive?

There are several other classes of teeth calling for extraction in which the patient's physical condition is not so much a factor: retained deciduous teeth; malalined teeth in adults; teeth which interfere with reconstruction, and submerged or impacted teeth (group 2). The disposition of the teeth in these classes depends on the ideal the dentist has in mind in dealing with his patients. If he is greatly interested in their general welfare and not solely interested in collecting fees, he will give them more consideration than otherwise.

Retained Deciduous Teeth.—In this class, we find those patients whose deciduous teeth have been retained beyond the normal time when they should be lost. Some of these patients have permanent teeth which are slow in erupting but which are in place. In this case, if the time for eruption is well past, we should advise extraction, even though retainers will be necessary to maintain the space.

If no permanent tooth is ready to replace the deciduous tooth, it should not be extracted. To extract such a tooth simply to replace it with a bridge, except in very rare cases, is contraindicated.

Malalined Teeth in Adults.—Here again, we are confronted with the need of making a decision as to whether or not a tooth should be extracted. In those cases in which the appearance is seriously affected by a tooth very much out of line, we must decide, in correcting it, whether to bring it into line or to extract it.

Teeth Which Interfere with Reconstruction.—We are frequently confronted with the problem of deciding the fate of sound vital teeth, generally too few in number, to be used in reconstruction and which must be removed.

A further study of the teeth in Group 1 shows the need of very serious consideration in disposing of each group. I shall discuss each group separately.

Pulp Involved Teeth.—By pulp involved teeth, I mean those in which abnormal pulpal conditions have developed or from which the pulps have been removed. The first class that we will consider are those in which pulpitis has

developed. When such a condition has occurred, it remains for the dentist to reduce the inflammation, remove the pulp or remove the tooth. If he cannot secure a condition of health and comfort in the pulp, he must decide on removing the pulp. If the patient's condition contraindicates retaining a pulpless tooth, or if the dentist feels unable to perform such an operation, he must either refer the patient to someone for a root canal operation or extract the tooth.

Pulp Degeneration.—In this class, we consider all pulpal conditions from pulp nodules to gangrenous pulps. Here again, let me remind you that the physician is the guide as far as the patient's health is concerned. If, in the opinion of the dentist, and we must leave it to him, he can fill root canals efficiently, and the patient's physician sees no objection to the procedure, we can remove the pulp and save the tooth. If there is any question in his mind as to whether the tooth can be placed in a satisfactory condition, even though the physician sees no objection in the way of the patient's condition, he should hesitate and instead advise the removal of the tooth. If the apical tissues show destruction, all teeth in all classes of patients, except the upper anterior six, should be removed. In well patients, these may, in some instances, be saved by root canal operations and curettage and resection.

Pulpless Teeth. — These are divided into two classes: those that show apical involvement, and those that do not.

In patients whose resistance is normally low or temporarily impaired, or who, for any other reason, are not in good health, all teeth showing destruction of apical tissue should be removed. In patients even in good health, only the upper anterior teeth—the central and lateral incisors and cuspids—can be considered savable. These the dentist should open, sterilize and fill. Thereafter, the involved apical area and root apex should be curetted and resected.

Teeth Which Do Not Show Apical Involvement.—Of all the teeth in the mouth calling for a decision as to retention or removal, these are the most perplexing. The question is settled on the basis of: (1) the general physical condition; (2) the quality of the root canal work; (3) the number of such teeth present; (4) the presence of periodontoclasia; (5) the value the patient places on the teeth; (6) the presence of sinus infection, and (7) the condition of the pericemental membrane of such teeth.

Teeth Involved with Periclasia.—If the patient's health is impaired, if only a few teeth remain in the mouth or if an insufficient amount of roots is left in the process to insure stability and health, we should extract the teeth.

If the patient is not keenly interested in cooperating faithfully with the dentist in an effort to save the teeth, we should advise extraction. If there is not too extensive alveolar involvement, not too many teeth involved and the patient's health is not seriously involved, we should save the teeth.

Teeth Affected with Parietal Abscesses.—The saving or extracting of such teeth depends on the patient's physical condition, and the location, extent and accessibility of the abscesses. Many such teeth can be saved for years in an apparently healthy condition, while, on the other hand, some are difficult to handle. This class presents conditions calling for different methods of handling and should receive very careful attention in an effort to save them. If the area is not accessible or is too extensive, we should extract the teeth. If it can be opened and

drained and is not too extensive, we can save them.

SUMMARY

There are certain conditions purely local in extent that call solely for the opinion and decision of the dentist. Again, there are others more serious in nature, and here the dentist should confer with the patient's physician, who is the only one competent to advise. Between the dentist and the physician, the question is decided, it always being kept in mind that it is the patient's interests that should be served first. These interests are protected by a proper spirit of cooperation between dentist and physician. The dentist should not proceed to make decisions without having in his possession necessary information about the patient's general health.

On the other hand, the physician should never be guilty of a practice that cannot be too severely condemned: he should, under no conditions that I am familiar with, send the patient to a roentgen-ray laboratory for a full mouth examination and proceed to diagnose the case and send the patient to an exodontist, asking that certain teeth be removed.

If, in his opinion, based on previous experience, the physician believes the patient's dentist is not competent to assume the responsibility of handling the case, he can tactfully suggest another dentist whom he believes can do so. If the dentist finds the physician is indifferent or incompetent, he can tactfully suggest that another physician be consulted.

This solves a problem that has worried many a physician and dentist. The dentist should seek to protect the patient's interest. The physician should do likewise. No one realizes more than I do the difficulty of presenting this subject, and it is my hope that I may have helped somewhat in finding a solution. In the handling of mouth conditions definitely tied up with the patient's health, there is a place for the general dentist, the physician and the oral surgeon. They can function harmoniously without invading one another's territory if they really try.

The most important objective of such close cooperation between physician and dentist is not confined to deciding what teeth shall be saved and what shall be extracted, important as this is to all concerned. Its field of usefulness reaches beyond this. The majority of people who come to the dentist are in a condition of health. Those who go to a physician are, if not sick, at least in need of medical or surgical attention.

The dentist, following the plans advocated in this paper, quickly falls into the habit of referring his patients to their physician for physical examination. The importance of this is appreciated by nearly all patients. They also appreciate the next step, that of reminding them on the anniversary of such an examination to go again for a yearly check-up. They soon fall into the habit of this yearly physical examination by their physicians and become quite enthusiastic over it.

The physicians on their part are not unmindful of the fact that a dentist who adopts such an attitude toward his patients is a man in whose care they may wish to place patients who require the best that dentistry has to offer.

DISCUSSION

William M. Storey, Madison, Wis.: Dr. Best's use of anesthesia in diagnosis is interesting. My own application of anesthesia in diagnosis has been limited in a large measure to such things as making explorations, determining the depth, extent and ramifications of cysts, sinuses, etc., and making differential diagnosis. By blocking off a portion of either the mandible or the maxilla, we can more easily locate the seat of pain, such, for in-

stance, as an incipient dying pulp, which, many times, at the early stages may be difficult to find. These suggestions will, no doubt, bring other uses to mind. The discussion of consultation and cooperation with physicians is a popular topic just now. I have never heard of any one having too much education or of knowing too much about anything. On the other hand, let us not be too anxious to side-step our responsibilities. Let us take a lesson from the methods of the Army, one of the oldest and most honorable of professions. The commander of a unit has a staff. A staff is that on which to lean. The rôle of the staff is to provide the information and advice needed by the commander for making his decisions. The staff must know at all times, as a basis for this work, the situation and the needs of the troops. The staff furnishes data and advice for the plan; puts the machinery of the command in motion, and coordinates and follows up its efforts, and acts as assistant to the commander, but never commands. The commander formulates the plan and general outline of his proposed maneuver, and conducts it by a series of successive decisions. The staff neither commands nor executes, and serves the commander best when it assists the troops most. A staff is not a legislative body whose decisions are binding on the commander; it is an advising body whose council may be taken or left, or taken in part. If a commander permits others to decide for him, he abrogates his function and ceases to be commander. The commander must himself make all important decisions. To command is his prerogative. In America, we have medicine and dentistry, a profession divided into two parts, so to speak. Some years ago, the American Medical Association had a Section on Stomatology. Later, this department was dropped, the gauntlet and challenge being thus squarely thrown at the feet of the dental profession. Oral and dental diagnosis is our business. These subjects are not taught in any medical school in the country. Medical men are well trained. Many regard the medical profession as being top-heavy with education at the present time, but medical men are not trained at all in dentistry. To be sure, the modern physician has the background, the foundation, everything on which he can build and, in a reasonable time, may become a specialist; but until he has studied dentistry and has become especially qualified, he is as seed that has not yet been planted. Consider well the advice of your medical staff officer. If he knows more than you do, sit at his feet, but don't shift responsibility, don't fail to measure up to requirements when you are supposed to be the one that knows. If you don't know what to do or how to do it, refer the patient to some one who does. The decision as to what teeth should be removed and when involves careful consideration of all the circumstances affecting the particular problem. It requires a methodical analysis of the facts and factors which might influence the decision, a proper assignment of values to those facts, a weighing of the advantages of every possible course of action, and finally a decision as to the one which promises greatest success. As Dr. Best has said, there is a great deal of disagreement among dentists themselves as to the status of the pulpless tooth. Isn't it true that when we have disagreements, it is because there is a lack of knowledge? Problems of science are not solved by argument but by study, research and carefully controlled experimentation. Several months ago, the Germans built the big airplane, the Dornier DX. The plan was conceived; the blueprints were made; the ship was constructed and finally finished. Then what happened? Without fear or trembling, question or misgiving, the sixty-eight men who built the plane were the first to go on board. They were immediately followed by 100 people. The mighty engines roared, the plane took the air, flew over Switzerland, returned and made a perfect landing. Dentistry is a new profession; aeronautics not half so old, but we need more science, we need more facts. No tooth is a good tooth that interferes with health or keeps the dentist from practicing better dentistry. A tooth may interfere with health because it may be (1) a specific focus of infection; for instance, an abscessed tooth, a local septic condition, possibly terminating in septicemia; (2) a focus causing a metastatic disease, a primary infection causing a secondary infection, such as endocarditis and nephritis; (3) a focus of infection lowering resistance and vitality; (4) a possible focus of infection which makes its retention in the mouth far more dangerous than its value as a dental apparatus would warrant. The removal of the cause has been a fundamental principle in the treatment of disease since the practice of rational, scientific medicine. There isn't any use putting medicine on a foot as long as there is a nail in the shoe. With the

research work that has been done in medicine, as well as in dentistry, in prenatal care, diet, nutrition and preventive dentistry, coupled with the unparalleled state of perfection of the mechanical accomplishments of dentistry, the problem as to when to remove infected teeth should not bother us a great deal. There are a few general principles that should be kept in mind in considering infected teeth, in making an estimate of the situation. It is generally accepted that the bacteria usually present in these areas are streptococci. The streptococcus, like its cousin the pneumococcus, has a very poor antigenic reaction. I mean by that that when we have an attack of pneumonia, instead of being vaccinated and rendered immune as we would be, for instance, after an attack of smallpox or typhoid, to the contrary we have an increased susceptibility, a lowered resistance to the germ, and the more often we get pneumonia, the more likely we are to get it again and the more virulent the infection becomes. Thus it is with streptococcic infection. So in making a diagnosis and in recommending treatment we should do our work thoroughly or not at all. In the event the physician tells you that the patient is suffering from a disease that is or may be caused by streptococcic infection, our responsibility increases. Many men base their decision to remove infected teeth on the size of the granuloma or on the extent of the destruction of the apical tissue. As far as we know, it has not been decided at just what age or size these abscesses attain puberty. Basing my opinion on clinical experience, study and laboratory work, I believe that a large granuloma shows a higher state of resistance on the part of the patient, and I have found, too, that it is much easier to find streptococci at the apex of the roentgenographically negative root tips of devitalized teeth than it is in the ones with the large granulomas. Heart trouble now virtually heads the death rates. Closely following are kidney involvements. Medical authorities have long since agreed that early infections are the cause of most of the heart trouble which becomes evident in later life. Dental diagnosis for children calls for everything that we are able to give. Before making the final diagnosis we should stop to consider just where we would send our patients to have the heart or kidneys treated. In other words, let us not wait until we have lost our opportunity. If a tooth has to come out, we should extract it early. If there are any good results to be obtained, we will then get them early and the patient will be the better for it. The younger the patient, the easier the operation and the speedier the recovery. I quote from an editorial entitled "Wanted—A New Spirit"[1]: "No young dentist ever comes to realize the fullness of his professional obligations, nor does he actually taste the sweets of the professional reward, till he has encountered the drawn and tortured face of agony and has been able by his ministrations to relieve the suffering. There is no reward of professional life—surely no reward of material kind—that can ever equal that of looking into a human countenance and seeing the tense and stressful lines relax and the drooping eyelids close in blessed sleep after prolonged and racking pain. Call it banal or what you will, but there is something very real and very satisfying in having acquired the ability to control and eliminate pain and in being given the privilege of doing this, and the young dentist who comes into this realization has his first taste of what is meant by sanctified service. Not till he has experienced this is he a professional man in the true sense and not till then does he catch a glimpse of the real spirit which goes to make up the best of professional life." However pleasant and inspiring it may be for the young dentist to learn of his ability to control pain, how much more pleasant it is for him to be able to make a diagnosis, proceed with his work and, with a faith and confidence akin to that possessed by the builders of the big airplane, watch his patients recover from systemic disease. Now this ability to diagnose, this faith and this confidence doesn't come from reading contemporary argumentation, nor in following blindly methods or statements of others, but from a basic and fundamental training to sift the wheat from the chaff, to know how to study and to know how to utilize the findings of unprejudiced, unbiased scientific research. Let us as an organization do what we can to encourage research as it is known in science, the search for the truth.

A. Y. Russell, Baltimore, Md.: Dr. Best has referred to the economic side of the question of elimination of pain in saying that some will see in it a most unusual opportunity to increase their practice. I cannot condemn this attitude when viewed in the light

1. J. A. D. A., 17:726 (April) 1930.

of better service to the masses, and as the one effective way of relieving the dread of the patient facing dental work. If the entire dental profession should decide today to use every means at their command and make a concentrated effort to eliminate pain and fear of pain at the hands of the dentists, I predict that, in a reasonably short time, the public would visit the dentists for early diagnosis and preventive work with no more fear than of having glasses fitted. Let me urge that you put into practice the suggestions of Dr. Best and help to banish from the minds of the public the horror and fear which have been instilled by the careless operator. The second point under discussion, when to extract teeth, while important, seems the most undecided point in oral diagnosis. The literature on this subject as pointed out by Dr. Best seems to afford sufficient evidence in favor of as well as against the extraction of pulpless teeth. Dr. Best has classified teeth as to need for extraction. It is my belief that all pulpless teeth, as a matter of prevention, should be extracted. This statement must not be construed as indicative of a destructive policy, but one of prevention. Dr. Best has pointed out that in the majority of pulpless teeth, the condition may be prevented and the necessity for wholesale extraction be thereby eliminated. May I review a recent case? A man aged about 48 in good health was paralyzed on the right side while playing golf. His brother owns and operates one of the best hospitals in this state. The patient was carried to this hospital, and the usual physical examinations and tests were made. The patient could have obtained any amount of life insurance from the report of these tests. He was then brought to me for oral examination, and, to my surprise, there were only three upper teeth vital, the others being pulpless and many showing osseous changes indicative of infection. The point I wish to emphasize is, did the test in this case indicate the serious state of health of the patient? Should his pulpless diseased teeth have been extracted before or after his paralysis? Do we want to wait until the patient has fallen by the wayside to attempt to do something? I could report many such cases if time permitted. My opinions may be biased and influenced by the fact that most of those referred to me for oral diagnosis are sick patients. It seems that some of those who have fallen by the wayside, broken in health, could have been saved, had preventive measures in the form of extraction, been followed at the proper time. I am not unmindful of the fact that thousands of pulpless teeth are being used by our patients to masticate food. Some of these patients have no apparent systemic involvement, but, may I ask, how many pulpless teeth do you extract that you wish you had left unmolested, and how many have you left with the patient that should have been extracted? Shall we wait until our patients are sick before doing the work that should have been done as a preventive? The way of prevention of pulpless teeth has been pointed out clearly by Dr. Best. Will you give your patient the benefit of this type of service? The point left out of this part of the paper is that of the acutely infected tooth or the so-called acute abscess. Dr. Best may have considered this question closed by former writers, but we still see reports of many deaths following the extraction of teeth. Early diagnosis, the prevention of decay and the prevention of pulp death will minimize the necessity for extraction. Should we retain pulpless teeth in apparently healthy individuals until there is evidence of local or systemic disturbance? I say, no; that is, if we are to continue to think and to practice along the lines of prevention.

Dr. Best (closing): When to extract a pulpless tooth—what a problem! Here, we have a tooth, and we see from the roentgenogram that it is quite obviously a tooth in which a dentist has been doing root canal work. He has not filled the canal to the end. What goes to the end of the root from that point? Is it vital pulp tissue, is it diseased tissue, or is it secondary dentin? It is a grave responsibility for anybody to remove a tooth of that kind and find it in no way a factor in producing disease and to discover that the tooth had vital pulp tissue on the apex. But suppose there was diseased tissue there, and the roentgenogram was what we call negative, giving no evidence of apical disease. That is the thing giving us more trouble than anything else—negative films. We see no destruction of the bone tissue, and we have been saying, "Oh, yes, we check them every year. They look all right, so we don't take them out." Many a serious infection may be present around such a tooth. What we are afraid of is the possibility that that tooth may make the patient sick. I insist that the dentist is

not the man to determine whether a patient is sick. That is distinctly for the physician to determine. We can cooperate; his work overlaps ours. He is the one in the ultimate analysis, regardless of what we say, who will advise as to the patient's general well being. The patient goes to his physician, the physician makes his report, and if it is "This patient is in a perfectly normal condition; I see no reason in the world for the extraction of this tooth," we leave the tooth in, and our skirts are clean. We are not assuming the responsibility that we are not justified in assuming. On the other hand, let us take exactly the same teeth, and when the physician tells us that the patient is suffering from a condition that might be coming from his teeth, if he has eliminated everything else, it is a serious responsibility to insist on retaining those teeth which may seriously damage the health.

ORTHODONTIC DUTY OF THE DENTIST TO HIS PATIENT

By L. M. WAUGH, D.D.S., F.A.C.D., New York City

DENTISTRY had its beginning in answering the demand of a sufferer for relief from pain having origin in the teeth. Even now, there is more suffering from lack of dental attention than from any other cause, especially in remote districts where dental care is not available. The most positive means of giving relief was the removal of the offending tooth. This could be done by a relatively simple mechanical process, and the sufferer would feel that he had been cured; but as one after another tooth was lost, it became evident that teeth play a part in digestion and the maintenance of health.

It was therefore realized that while extraction would give relief from the immediate pain, it was not the end but really the beginning of a new and often a vexed problem. It thus became evident that lost teeth should be replaced and diseased ones so treated that they could be made comfortable and retained in usefulness. All of this, it seemed at first, could be done by anyone who was deft with his hands. Nothing was understood or even suspected regarding the vital connection and interdependence existing between the teeth and the rest of the body.

Therefore, from early time, even among the ancients, barbers, jewelers, goldsmiths and whoever cared to could become a dentist by simply giving notice of intent to an unsuspecting and defenseless people. So it remained through a number of centuries among different races until, just a few years ago—ninety, to be exact—a course of organized study supplemented by techncial training was instituted, so that a dentist of *education* might replace the one of *proclamation*. So much improved was the service given the people in the immediate years to follow that public demand exceeded the supply; a constantly increasing number of students were attracted, and more schools of dentistry established to meet the demands for the training of a sufficient number of graduates to serve a rapidly increasing clientele, so positive and apparent were the benefits of dentistry.

Restorative procedures and methods of treatment soon became so varied and com-

plicated that it was increasingly difficult for one practitioner to master it all. Individual preference, or perchance the demands of a practice, inclined to the giving of increased attention to some particular type of work. This led gradually to the devotion of more thoughtful effort to that branch, resulting, quite naturally, in increased practice in the special field, and the dentist so doing was said to be "specializing." This term does not imply exclusive practice.

The first effort at exclusive specialization in dentistry was made only thirty years ago, when Edward Angle proclaimed himself an orthodontist, announcing to the profession and his patients that he would limit his practice exclusively to the correction of malocclusion of the teeth. In the following year, he offered a course of instruction in his office to a class of dentists, who must, as an entrance requirement, pledge themselves thereafter to practice orthodontia exclusively. It was a bold move and, as might be expected, evoked considerable critical discussion. He had become convinced, as the result of experience, that the exactions of the practice of orthodontia as an exclusive specialty are such as to demand all of the best that the practitioner can give.

While there may be some who cannot agree with this, please do not misunderstand, when I point to the fact that leading educators and practitioners, both in dentistry and medicine, have spoken of orthodontia as the most distinct and best organized specialty in the entire realm of health service. In orthodontia, as in every specialty, there are those who have more enthusiasm than tact, and, occasionally, those who lack good judgment. They are usually the less experienced, who have, therefore, not developed a broad vision of the whole picture. The specialist has been humorously defined as "one who knows more and more about less and less." It is not difficult for one working in a restricted field to concentrate so closely that his horizon becomes narrow, shutting out the larger service of which his is only a small, even though important, part. The general practitioner, being concerned in the larger service, quite properly cannot condone this narrow view, for it is to him that the public look for general care and guidance.

There must be a common level on which all practitioners in health service can meet in cordial and sympathetic understanding if the best interests of the patient are to be conserved. Anything less than this would be unworthy of a health worker and a betrayal of public confidence. It is the object of this paper to bring out an expression of opinion regarding that level on which the general practitioner and the orthodontist can meet for the best interest of the patient.

Every child should be taken to the dentist at the time that the deciduous teeth are fully erupted. The average age varies from 2½ to 3 years. Disturbances in deciduous dentition may have required his attention earlier, but a thorough examination should invariably be given when the deciduous dentition is completed.

The first dental examination should embrace four particulars: 1. The general condition of the mouth, observing the mucous membrane, the labial and lingual frena, the tongue, possible conditions that might interfere with proper breathing, as adenoids, abnormal tonsils and nasal obstructions. 2. Possible pressure habits, such as thumb sucking, tongue, cheek or lip biting, resting the face in the hand, as in study, and pillowing habits. 3. Dental caries. 4. The occlusion.

Recognizing, recording and giving proper advice is imperatively the responsibility of the general practitioner. How much correction he may wish to do himself will be entirely a matter for him to elect. The one cardinal responsibility that he cannot escape is that he must either treat the defective conditions himself, or inform the parent or guardian explicitly as to what is needed, and be ready to advise where such service can be obtained. Less than this is failure to fulfil the reasonable expectation of the patient. There is no one thing in dentistry that is more important, and it should, therefore, be given all of the time necessary for thoroughness. The value of the service should impress itself and the law of average determine proper compensation; but in any case the fact must be recognized that anything less than a thorough examination and proper advice cannot be otherwise regarded than neglectful practice.

As regards the general condition of the baby mouth, the healthy mucous membrane should be a glistening deep pink and of lesser tensity than later in childhood. There should be no sore areas. The labial and lingual frena should be normal. Breathing should be free of interference by adenoids, abnormal tonsils, tongue or nasal obstructions. Should any of these be observed or even suspected, they should be referred to the attending physician, the dentist at the same time expressing a readiness to cooperate.

By the early recognition and correction of the factors which predispose to malocclusion, the general practitioner can prevent the need for at least one-third of the orthodontic treatment at present demanded. The need could, in some cases, be entirely obviated and often only a simple treatment be required. A really complicated case, in nearly all instances, is the direct result of early neglect.

Preventive orthodontia lies almost wholly in the hands of the general practitioner of dentistry. Corrective orthodontia must be almost wholly the responsibility of the specialist. As the general practitioner recognizes early the factors which predispose to malocclusion and either corrects these himself or sees to it that they are corrected by someone else, so will he reduce the demands on the specialist. Prevention is nobler than cure, and is the only hope of coping with the overwhelming demand for correction. May we not all work zealously together for the conservation of the best interests of the patient?

THE CONSERVATIVE TREATMENT OF PERIODONTOCLASIA*

By HAROLD J. LEONARD, D.D.S., B.A., New York City

THE treatment of suppurative periodontoclasia may be regarded as successful when the gingiva becomes hard, firm and pink and is not hypersensitive, subgingival pockets no longer extend below the normal depth, and the gingiva covers the roots and interproximal areas as nearly as possible in view of previous recession. The teeth should be firm and stable in their sockets, without tenderness and with bone rebuilt about the roots as far as attached pericementum will permit. There should be no foci of inflammation or infection remaining about the teeth, and the masticating mechanism should be rebuilt to such functional relations that no traumatic stresses on the teeth tend to develop. As far as systemic causes of disease can be detected by symptoms in the periodontal tissues, they should be, and correction should be made by hygienic measures instituted by the periodontist or by systemic therapy instituted by a physician to whom the patient is referred. Comprehensive treatment in periodontia usually should result in a more hygienic manner of living and improved systemic health and well-being.

Such a result is not always possible by any method because of the inherent difficulties of the case when presented for treatment. Treatment of periodontoclasia is not a matter of a particular instrumentation, but a matter of discovering all of the factors in disease or in injury of the periodontal tissues, of correcting the conditions as far as possible and of stimulating the tissue cells to the most healthful reaction of which they are capable. Such a procedure presupposes a knowledge of the possible causes of disease and injury of the periodontal tissues, as well as sufficient skill in correcting them. I feel that periodontia suffers much harm because so many periodontists stress some instrumental technic or method of treatment which at best corrects but one cause and which draws attention from the many contributing conditions that must all be attacked if the best results are to be obtained. Unless the three types of causes, bacterial, traumatic and cell nutritional, are all kept in mind and each one looked for and corrected, the treatment of periodontoclasia is largely an empiric procedure.

By conservative treatment, I mean a comprehensive but minimum amount of treatment involving the least possible damage or destruction of tissue consistent with eliminating or correcting all causes of disease and stimulating the most

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*The papers of Drs. Leonard, Johnson, Berger and Kirkland were presented as a symposium on "Predominating Methods Employed in the Treatment of Suppurative Periodontoclasia."

healthful reaction. This treatment consists, in essence, in extracting hopelessly diseased teeth, treating the remaining teeth by apoxesis or root-surface treatment, instituting adequate home care, relieving mechanical causes of irritation and discovering and correcting hygienic faults or systemic disease conditions which interfere with the health and vitality of the periodontal tissue cells.

The results of such treatment depend a great deal on the technical skill which is used. Apoxesis, or root-surface treatment, is a technic which is simple in principle but in which it takes much time and practice to become proficient. It consists in entering the gingival crevice with properly designed instruments and removing all subgingival calculus and areas of roughness on the tooth surfaces, such as filling margins, enamel roughness and cemental spurs, and shaving or curetting the cementum surface as far as the pericementum is stripped from it, just enough and no more, to leave it smooth and free of fiber ends. The cementum in the cervical third of the root may be as thin as a human hair. It does not take much shaving or curetting in this area to cut into the dentin, and as it is very porous just beneath the cementum, a surface is left which soon fills up with bacteria and remains ever afterwards a source of irritation to the overlying soft tissue. It requires skill, patience and much practice to be sure that pockets are penetrated to their depths, all calculus is removed and not merely rounded off and the cementum in all parts is shaved to a layer which is sufficiently nonporous to be nonirritating. It requires a highly developed tactile sense, knowledge of the sensations conveyed by the instrument on the various structures it touches, a sufficient instrumentarium and skill and practice in its use. Several types of instruments, such as various hoe scalers, curet scalers, prophylactic files and Towner periplanes are designed for this work. Except for differences in delicacy, in reaching difficult points without lacerating the soft tissues, they are, in the hands of one expert in their use, probably all equally effective for the purpose.

Next to the perfection of apoxesis, and perhaps even surpassing it in importance, is the subsequent home care. The result after apoxesis is a clean root surface surrounded by a blood clot held in by a loose collar of gingiva the tissue of which is infected, degenerated and in a state of passive congestion and chronic inflammation. To restore this to a tightly hugging, vigorous, healthy tissue from which bacteria are eliminated and in which cementoblasts and osteoblasts can rebuild pericemental attachment and new alveolar bone is a matter for the greatest care. It demands a technic of home care by which the exposed tooth surfaces are kept free of bacterial accretions and the gingival tissues are massaged to the depths of the zones of congestion. For this purpose, the brushing-massage technic known as Charters' method, by which the sides of the bristles are forced against the interdental papillae from the direction of the occlusal surface in a series of pressures and releases, seems to give the best results. Dental floss applied so as to clean the proximal tooth surfaces and give pressure to the base of the gingival crevice is also necessary, especially where the interdental gingiva is lost, an interdental space remaining. Finger pressure applied and released many times on areas of deep soreness or where the tissue is thick may be indicated for a period after treatment.

Treatment of mechanical irritants, such as food impaction and traumatic occlusion, is too wide a subject to be discussed fully here. Suffice it to say that

success in treatment largely depends on the knowledge and skill with which this phase of the work is approached. Unless mechanical conditions can be so repaired as to prevent food impaction, and to prevent shifting or cuspal interference during mandibular movements, and to reestablish salivary drainage if it is lost through bite closure, periodontal treatment of any kind will not be of permanent value.

Systemic treatment for periodontoclasia is just in its beginning. It has three main objectives: (1) the physiologically clean mouth, (2) proper nutrition of the periodontal tissue cells, and (3) stimulation of cementum and bone building activity in these tissues. It is to be accomplished theoretically by inquiring into the patient's dietary and hygienic habits, correcting those habits in accordance with the requirements of his condition and, at the same time, discovering and eliminating any systemic disease which is interfering with the patient's nutrition, metabolism and resistance.

Practically, this program can be put into effect to only a limited extent. The physiologically clean mouth can, in most cases, be attained in a patient who will cooperate by limiting the intake of energy-producing foods, increasing the amounts of raw acid-fruits and raw vegetables and increasing mastication and, as a result, insalivation. The proper nutrition of the periodontal tissue cells is accomplished in much the same way. The diet should be limited to the bare caloric requirements of energy-producing foods, but should be supplied abundantly with all the necessary vitamins and mineral elements. Elimination should be regular and thorough, and the balance of exercise, work, recreation and rest such as to lead to good functional relations throughout. Systemic disease, whether infectious, degenerative or metabolic, should be discovered and treated so that its effects will not interfere with the functioning of the gingival and periodontal tissue cells. This all involves a knowledge of dietetics and nutrition and its application to the peculiar physiologic and pathologic conditions of the patient, which is at present beyond the dentist, even the dentist in cooperation with the internist. Undoubtedly, the training of dentists must develop along this line.

Treatment to stimulate bone formation by systemic means is just in its infancy. Probably this is a line which, in the future, will give aid to the conservative periodontist in his efforts to rebuild normal periodontal tissue. At present, it is a virgin field. Milton T. Hanke, Sherman L. Davis and others are experimenting with vitamin concentrates, calcium additions and endocrine extracts to determine means by which cementoblastic and osteoblastic activity may be stimulated in periodontoclasia to bring about restoration of destroyed tissue. As yet, their work is far too tentative and inconclusive to be put into general practice. This subject also is so bound up with individual physiologic, pathologic and psychologic conditions in each patient that experimentation is not to be lightly undertaken by one who is unprepared in general physiology, pathology and physical diagnosis. The periodontist of the future, to be of the greatest service, should be prepared along these lines.

Because, until recently, the causes of periodontoclasia were not generally understood, treatment of the disease was a matter of trial and error and dozens of different treatments were advocated. The field is still full of patent medicines, which must evidently have a market, and, from time to time, freak treatments are recommended by prominent dentists; but,

on the whole, periodontists have settled down to two main methods of treatment as far as concerns the surgery of the root surfaces and gingival tissues. These methods consist, in the one case, of treatment designed to restore health to all the remaining gingival tissue and, in the other, of surgical removal of the diseased tissue.

These two methods are based on quite different concepts of the pathology of periodontoclasia and the reactions of the tissue which are possible under appropriate treatment. The proponents of the surgical removal method believe that gingival and periodontal tissue once detached from the cementum is permanently detached, and that no reattachment can occur, or at least does commonly occur. They believe, therefore, that a pocket beyond the normal gingival crevice depth will remain a pocket, subject to the accumulation of exudates and to infections unless the overlying tissue is cut away or shrinks away. This was G. V. Black's idea, and while he did not advocate resection, he believed it necessary to irrigate pockets regularly with a syringe to keep them free of accumulations.

There is just one fundamental objection to the methods of surgical removal of the diseased gingival tissues and that is the unnecessary loss of investing tissue of the teeth, with all the sequelae of such a loss. These sequelae are: a ghastly appearance; increased difficulty in keeping the teeth clean; frequently, extremely sensitive and uncomfortable exposed root surfaces; increased tendency for abrasion or caries to cause cavities in the exposed root surfaces, and a decreased amount of supporting bone. By this method, not only is bone reformation prevented but also some of that remaining is usually removed. The great amount of pain and discomfort following some methods of removal of gingival tissue, and due to leaving exposed raw surfaces of soft tissue and bone, is an objection that can be largely overcome by the method of operating or by the after-care of the wound.

The conservative method of treatment is based on the experience that the soft tissue overlying a pocket can ordinarily be made healthy and kept healthy, and thus removal becomes unnecessary. There is excellent histologic as well as clinical evidence that reattachment of the overlying tissue does occur and that such reattached tissue acts as a scaffolding or matrix for alveolar process to build into. Nearly all periodontists who have made careful records have cases in which there is incontrovertible evidence of a new bone growth of alveolar process into such reattached tissue, almost if not quite to the normal border level. It is so extremely desirable to obtain such restoration of attachment and supporting bone that the conservative periodontist attempts in every way to accomplish it.

While a healthy gingiva and periodontium as a general rule follows on adequate conservative treatment, the definite restoration of a pericementum and supporting bone to cementum which has lost them is by no means always to be expected. A number of factors enter into such restoration, not all of which are under the control of the periodontist. These factors probably are as follows:

1. The perfection with which calculus, organic débris and porous cementum are removed, leaving a comparatively nonporous, smooth and nonirritating cementum surface.

2. The elimination of traumatic conditions which tend to destructive irritation of the periodontium.

3. The stimulation by massage and tooth function of circulation in the gingiva, remaining pericementum and re-

maining alveolar bone, by which residual bacteria are eliminated, connective tissue fibers are tightened to eliminate any space for accumulation of stagnating fluids or débris and cementoblasts and osteoblasts are mechanically stimulated to renewed activity.

4. The restoration of a fluid medium bathing the periodontal cells which supplies the necessary ingredients for cementum and bone formation and stimulates, by chemical activators, the cementoblastic and osteoblastic cells. These chemical activators may be endocrine hormones or vitamins, both of which are apparently easily antagonized and neutralized by toxic substances coming from almost any type of infectious or metabolic disease.

Whether or not the presence of an epithelial lining to the base of the periclasial pocket inhibits reattachment and new alveolar bone formation is a moot question, the affirmative being taken by Gottlieb, Box and McCall, who believe it must be removed before reattachment can occur; and the negative, by many other equally scientific periodontists who have seen reattachment and new alveolar bone build in where the epithelial lining was not removed.

Of these factors, one or more may be impossible of accomplishment in any given case, and the result is a failure to bring about the desired restoration of periodontal tissue. It is not always possible to leave a nonirritating cementum surface as the result of apoxesis. The cementum, especially in the apical half of many roots, is cellular throughout, and no amount of planing will arrive at a layer which is sufficiently nonporous to be nonirritating. A porous surface is irritating because the pores are filled with putrefying exudate, cell remnants and bacteria which are inaccessible to phagocytic cells. By no present treatment can such a surface be rendered sufficiently nonirritating that the formative connective tissue cells can lie in health against it. The result in such a case is a continuing pocket without reattachment or new bone formation. The effect of apoxesis therefore, depends not only on the skill of the operator, but also on the cementum structure of the root on which the deep pocket exists, a condition beyond the control of the operator.

It is not always possible to relieve the tooth of movements which tend to destroy bone as fast as it forms. Where deep pockets exist, there is a pressure from inflammatory processes, tending to force the tooth out of its socket. Grinding to relieve traumatic occlusion in such a case is liable to cause extrusion of the tooth, and extrusion means a readjustment and damage to all the connective tissue fibers which still attach to the cementum, causing additional damage to the pericementum. It also brings the tooth again into occlusal contact so that the lateral movements are resumed. It is not always possible, under these conditions, to grind the teeth in such a way as to maintain occlusal contact and prevent extrusion and at the same time prevent lateral movements of the tooth in its socket. Ligating may help at times, but even this is not always satisfactory. The prognosis is especially unfavorable if the tooth is alone in supporting the occlusion on one side, so that nothing can be done to stabilize it and give it physiologic rest.

If systemic factors which cannot be diagnosed or corrected militate against the restoration of health to the periodontium, the treatment may result in failure, pockets may refuse to close and reattachment and rebuilding of bone become impossible.

As a result of some of these conditions which are at present beyond the control

of the periodontist, the conservative treatment of some teeth affected with periodontoclasia will result in failure. Deep pockets will fail to heal either by reattachment or by shrinkage of the overlying gingiva; exudate will continue to form, and it becomes necessary either to extract the tooth or to remove the overlying gingiva. There is therefore a definite place for surgical elimination of the gingiva overlying a pocket, but such a procedure is exceptional or a last resort in cases where conservative treatment has proved ineffective.

It should not be understood by this that all teeth affected by periodontoclasia must first be treated by the conservative method before it can be determined whether further surgical interference is necessary. The experienced periodontist will establish certain guides by which he can estimate fairly accurately whether conservative treatment is or is not indicated for any affected tooth. These guides are involved in the following questions: 1. How badly is the tooth involved? 2. What types of periodontal structure and tissue reaction are to be dealt with? 3. Can the causes of the disease be eliminated? 4. Is the tooth worth saving?

The condition of a tooth may be considered hopeless and its extraction advised if a pocket reaches to within 4 mm. of the root apex, or if the supporting bone is more than half gone or if it has been loose for some time and absorption of the apex has commenced. If the bifurcation in a multirooted tooth is completely denuded of attachment, the prognosis is unfavorable. Even in extreme cases of mobility and pocket formation, teeth have been brought back to health and function when the causes of disease could all be discovered and eradicated. The prognosis sometimes depends more on the surrounding conditions than on the degree of pathologic involvement.

Among the factors making prognosis favorable or otherwise is the structure of the supporting bone. If bone is heavy and the teeth are regular, conditions are more favorable than if the bone is thin and imperfectly covers the teeth and the teeth are irregular and the roots crowded. The patient with much calculus and pus flow offers a better prognosis than the one with equal periodontal involvement but little show of exudate or inflammatory reaction. The inflammatory condition of the gingiva marked by hypertrophy and swelling can more easily be restored to normal than that in which the gingiva has receded and remains thin. Another essential factor is the adequacy of the patient's home care, which is dependent, in turn, on the interest and zeal of the patient and on how well he is taught. Prognosis depends on the perfection with which the causes of disease can be eliminated and healthy function stimulated. Many teeth should be extracted before treatment is attempted, because it can be seen at the outset that, in their case, the causes of disease cannot be checked.

Many teeth affected with periodontoclasia should be extracted because, even if saved, they are worthless. The possibilities in restoration should be considered, and teeth which are useless from this standpoint should be extracted without treatment. This applies particularly to involved lower incisor teeth of which one is already lost, leaving a gap. It also applies to teeth tipped into a space in which a partial denture saddle is to be inserted. In patients who have lost many teeth, while the remainder are affected with periodontoclasia, it is far preferable, from the standpoint of health, appearance, expense and comfort, to extract the remaining teeth and insert full dentures

than to try to treat them and insert any sort of restoration. The periodontist, although it is his business to save teeth affected with periodontoclasia, must keep his perspective and work in conformity with that which is best for the patient as a whole. If the periodontist is to serve as an oral diagnostician, he must think from the standpoint of many specialists beside the one whose function is supposed to be the saving of teeth affected by periodontoclasia.

GINGIVECTOMY IN THE TREATMENT OF SUPPURATIVE PERIODONTOCLASIA*

By RAYMOND E. JOHNSON, D.D.S., St. Paul, Minn.

1. *What do you consider successful results in the treatment of suppurative periodontoclasia?*

WHEN suppurative periodontoclasia is successfully treated, teeth with at least half of their attachment remaining should become firm in their sockets, bleeding should stop, soreness and tenderness should disappear and the gingiva should cling so closely to the root that an instrument cannot be inserted more than a distance which may be considered normal.

Patients should return at intervals until these results are obtained. If any pocket remains open and unhealthy, or any gingiva is red or tender, or bleeds after a brief interval of home care following treatment, failure is indicated. Either some irritant remains or the patient is not doing his part.

The treatment of suppurative periodontoclasia consists in eliminating, as far as possible, the causes of the pathologic process and in stimulating the tissues to regenerate to a condition of good health and vitality. Causes such as the presence of systemic toxins must be treated by general hygienic measures. Local conditions such as the presence of plaques and detritus on the teeth must be eliminated by careful instrumentation, prophylaxis and home care, which keep the teeth clean and the gingival circulation vigorous. Traumatic occlusion, food impaction through poor contact areas and other forms of mechanical injury must be treated by appropriate means in order to be eliminated permanently. In this system, there is no room for drugs. It is believed by the vast majority of scientific students of this subject that drugs are unnecessary and help little, if at all, if the proper system of treatment is carried out. The objection to most drugs is that they are expensive and of little use and tend to create a false sense of security in the mind of their user.

2. *Give description of the gingivectomy method of treatment.* (*This may be illustrated.*)

Before gingival operations are performed, preliminary work should be done. The mouth should be clean, and mechanical irritation, such as faulty contacts, marked occlusal trauma and irrita-

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tion from faulty restorations, should be relieved. Root surface scaling should be done and the patient should have had a week or two of vigorous home care so that an excellent circulation has, as far as possible, been reestablished in the diseased tissue. Roentgenograms should, of course, have been taken, the diagnosis made of existing conditions and the plan of treatment outlined. If an extensive resection is to be done, it is wise to inquire regarding excessive bleeding. It may be advisable to determine the clotting and bleeding time, as it is sometimes difficult to control bleeding.

The operation is performed under procain anesthesia. Before an incision is made, the field of operation should be isolated from saliva by gauze sponges, and the tissue sponged with 3 per cent iodin solution followed by alcohol. As the operation proceeds, the area should be sponged with sterile cotton pellets or sponges. In this operation, as in all periodontal instrumentation, one is working on infected tissue, the manipulation of which forces bacteria and their products out into the blood stream. Therefore, considering the general vitality and resistance of the patient, one must gage the amount of such manipulation and operating that can be done at one sitting.

It is necessary in each case to remove all overlying tissue, thus laying the root bare to the depth of the pocket. To do this, it is necessary to trim off a little of the crest of the process because the detachment of the periodontal membrane from the cementum is in advance of the destruction of the bone. This can be observed in roentgenograms, as well as in microscopic specimens. This bone, when exposed, presents a honeycombed appearance, often uneven, with sharp edges. It is trimmed only enough to leave a smooth surface, the margins being beveled.

Arthur D. Black says[1]: "We may divide cases into three groups—those in which there are pockets on labial or buccal sides of the roots, those in which there are proximal pockets, and those in which there are pockets which encircle teeth." In cases in which there are pockets on labial or buccal surfaces, a vertical incision is first made from the gingival margin to the bottom of the pocket. This will be a guide for the horizontal incision. No interproximal tissue is removed where there are no proximal pockets. Where there are proximal pockets, it is necessary to remove the buccal and lingual bone and gum opposite the interproximal space to the level of, or a little farther apically than, the depth of the interproximal pocket. This should be done in order to eliminate the pocket. Pockets on the lingual side of the upper jaw are less often benefited by this operation because of the thickness of the bone as it curves away to form the palate, a broad shelf being thus left next to the tooth after healing. From the standpoint of blood supplied, it is desirable that all lines of incision be gradual curves, sharp angles being avoided.

After completion of the operation, the interproximal areas, as well as labial, buccal and lingual, are covered with Ward's pack or similar packs. The powder of Ward's pack, or the pack used by the United States Army Dental Corps, is made up of zinc oxid, asbestos powder, etc., and the liquid of eugenol and liquid petrolatum. This is mixed like cement, and is allowed to remain for ten days or two weeks. It keeps out foreign material, prevents postoperative pain and protects

1. Black, A. D.: Treatment of Chronic Suppurative Pericementitis, J. A. D. A., 7:134 (Feb.) 1920.

the raw surface until fresh granulations can form. The mouth should be kept clean after the operation to promote rapid healing. Operated areas should be frequently irrigated with a mild antiseptic solution until the toothbrush can be used. The toothbrush should be used regularly in areas where soreness does not prevent.

3. *Give reasons for your preference of the gingivectomy method over (a) conservative method (subgingival curettage) and (b) the flap operation.*

I do not prefer the gingivectomy method over the conservative except when indicated in areas where a wall of tissue prevents adequate cleansing or massage, or where the tissue has become very hyperplastic and resection is more rapid and effectual than reducing it by massage. There frequently occurs between the posterior teeth a condition of periclasia in which deep proximal pockets and bone loss has occurred with but little recession. The cause of this may be occlusal trauma, faulty contacts or other mechanical irritation leading to active bacterial infection. It is frequently difficult to remove with certainty all calculus from these deep pockets, and after it is removed, it is impossible to reestablish the normal circulation in this thick mass of granulation. Results from correction of the mechanical defects, root surface technic and good home care afterwards are more often unsatisfactory in such areas. A deepened color, continued tenderness and gradual extension instead of healing of the pockets, indicate a failure in the treatment. In such a case, a resection of the bulk of this mass of diseased tissue makes it possible to stop the progress of pocket formation and to attain a healthy condition.

In cases of chronic ulcerative stomatitis ("trench mouth"), pockets will frequently be left between teeth where the interdental tissue has been destroyed for some distance along the roots, while the buccal and lingual tissues remain intact. It is, of course, impossible for the patient to keep such areas clean, and they become filled with decomposing exudates and débris. This leads to further disease in the area as well as bad breath and impaired digestion from swallowing infectious material. In such cases, it is necessary to remove the wall of tissue on the buccal and lingual sides of this interproximal area so that the toothbrush bristles or other cleansing appliance can reach all exposed surfaces.

In the flap operation, the mucosa is stripped down from the area to be resected and is retracted, while the bone and connective tissue is cut or curetted away to the desired depth. The mucosa is then laid back over the wound, is trimmed to fit the resected surface and is then sutured into place. This method is to be preferred on the anterior teeth over the gingivectomy method for esthetic reasons, as there is a little less recession. On posterior teeth in which there are deep proximal pockets or pockets involving the lingual aspects where the thick palatal tissue must be laid back some distance to permit open view to the depth of the pocket, the gingivectomy method is most satisfactory. One will traumatize less tissue, and the work will be more thorough because of the excellent view of the field of operation. This is especially important when working on multirooted teeth.

4. *State all the disadvantages of your preferred method as compared with the others and give a complete list of its counterindications.*

In the last fifty cases of suppurative periodontoclasia, I have treated sixteen, or approximately 32 per cent, by the combination of gingivectomy and conserva-

tive methods, the operation being confined to localized areas. Twenty-four cases, or 48 per cent, were treated by the conservative method; while in the remaining ten cases, or 20 per cent of all cases treated, generalized gingivectomy was found necessary. In view of this survey, I can hardly designate the operation of gingivectomy as my "preferred method."

Each case is obviously a law unto itself, necessitating a careful diagnosis and proper consideration of all etiologic and other factors having a bearing on the condition. Gingivectomy is indicated in but a minority of the cases, for in most cases satisfactory results can be obtained without it.

It therefore seems impossible to make a statement regarding the disadvantages and a comparison with other methods. The disadvantages and the counterindications of the gingivectomy method may be enumerated.

The disadvantages of the gingivectomy method are as follows: 1. It leads to exposure of root surfaces, which look bad and may occasionally become sensitive. 2. It often involves the sacrifice of some alveolar supporting bone in order to make an even margin. 3. It removes any possibility of reattachment, which is now known to occur. 4. Because it is a quicker and more spectacular method of treatment than the exacting and tedious one employing the root surface technic, there is a tendency for some dentists to adopt it as a routine procedure in periodontia. 5. There is moderate postoperative discomfort. 6. Some patients are apprehensive of any surgical procedure.

The counterindications for its use are: (1) badly impaired health of the patient; (2) hemophilia and any other systemic condition which would make the patient a potential bleeder; (3) lack of cooperation on the part of the patient; (4) the presence of shallow pockets (i. e., in cases that can be successfully treated by subgingival curettage); (5) the position of the teeth, when esthetics must be given consideration (for example, the upper anterior teeth); (6) the impending loss of the remaining teeth, the retention of which will result in poorer ridges for dentures.

5. *What constitutes the conditions of suppurative periodontoclasia with (a) good prognosis; (b) poor prognosis; (c) negative prognosis?*

These conditions are as follows:

A good prognosis is based on (1) a definite knowledge of the etiology of the condition; (2) the good health of the patient (i. e., a high state of vitality of investing tissues as well as of the whole organism); (3) the intelligence and cooperation of the patient in the matter of home care; adequate diet and good habits, including those involving the environment, exercise and occupation; (4) functional occlusion; (5) vital teeth; (6) freedom of bifurcations of the posterior teeth from involvement.

Poor or negative prognosis is based on (1) a lack of knowledge of the etiology of the condition; (2) poor health of the patient; (3) lack of cooperation and bad habits of the patient; (4) lack of occlusion or traumatic occlusion because teeth are missing (no approximal support from adjacent teeth); contacts are poor or the remaining teeth, weakened from loss of bone support, must carry bridges or clasps; (5) pulpless teeth; (6) involvement of the bifurcations with a small jaw and slender, short-rooted teeth.

THE FLAP OPERATION

By ADOLPH BERGER, D.D.S., F.A.C.D., New York City

AS in the treatment of all diseases, so in the treatment of periodontoclasia, there can be no fixed standard by which a successful result may be measured. This is in a large measure individual. To illustrate: If the life of a patient who is suffering from a fatal malady is prolonged by a number of years through an operation, this may be considered a successful result, although the patient eventually succumbs to the malady. Such considerations would be further determined by the subjective and philosophic views whether life during this period was pleasant or even bearable.

To parallel this, in the treatment of periodontoclasia, the ideal successfully treated conditions are those in which a normal state is restored and the patient is no longer irked by special and laborious care of the teeth. This may be difficult and often impossible to attain, but we nevertheless conceive that it may be accomplished in the incipient stages and where the etiologic factors are in the main exogenous. Successful treatment, therefore, must be related to the graveness of the disease, the pathologic state, and other factors in the causation, the treatment and recovery from the disease. These are too numerous and varied to consider here.

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In a general way, a result may be considered successful when the following have been achieved: (1) removal of all local irritating conditions; (2) correction of abnormalities which may be etiologic in or conducive to periodontoclasia, such as relieving occlusal stress and restoring points of contact; (3) correction of constitutional conditions and errors in diet whenever this is possible; (4) elimination of inflammatory processes affecting the periodontium; (5) elimination of suppuration; (6) elimination of the pus pocket; (7) tightening of the tooth; (8) partial or complete regeneration of the alveolar process and reattachment of the cementum and peridental membrane.

In the flap operation, it is primarily intended to apply a surgical principle in the treatment of suppurative periodontoclasia. This may be briefly stated to be "visualizing the field of operation." That the mode of procedure does not entirely fulfil the application of this principle is obvious to those who practice or are familiar with this operation. Most operators raise a labial or buccal flap so that these surfaces of the teeth involved are brought into view. We know that the lingual and proximal sides of the teeth require just as careful exposure and accessibility. When the field of operation is thus visualized, it is possible to remove all concretions, degenerated or broken down portions of the alveolar process and the exuberant, poorly organized granulations which often fill the suppurative

pockets. Some men go beyond this and attempt to bring about a modified topographic relationship between the tooth and the periodontium which more nearly resembles "senile atrophy."

The operation consists of the following steps: Two vertical incisions are made through the mucous membrane parallel with the long axis of the teeth to be operated on. The number of these should not exceed four or five in a single operation. With a fine scalpel, the gums are next divided in the interdental spaces and about the necks of the teeth separating the labial and palatal tissues. The gingiva and the gums are raised from the bone so that the alveolar process and the roots of the teeth are exposed to view. With fine curets, scalers and hand chisels, all calcific deposits, broken down and degenerated soft and hard tissue and granulation tissue are removed. The tissues on the palatal and lingual sides are separated from the bone and pushed back to such an extent as their elasticity permits and these surfaces are similarly treated. The edges of the reflected gums are trimmed next so that they snugly cover the remaining alveolar process and are sutured into place, the sutures passing between the teeth. No packing nor application of dressing is necessary. The wound is treated by irrigation and rinsing with any antiseptic solution usually applied in the oral cavity, such as boric acid 4 per cent, or potassium permanganate 1:10,000.

This operation is not practiced by me by preference; nor should it be used by preference; as a measure of last resort, or as a short cut expedient. It has been frequently stated by some men that they use the flap operation when other, more conservative measures fail. This operation should be employed as the measure best suited for the case in hand. Treatment should be prescribed always in keeping with close diagnostic findings.

In comparing the flap operation with gingivectomy, we are impressed with the fact that, in gingivectomy, the possibilities of repair and regeneration of the tissues involved are entirely disregarded. In the treatment of tissue in which there can be no vicarious substitution and of which there is only a limited amount, the utmost conservatism should be exercised at all times if function is to be preserved. In the flap operation, all of the impaired tissues are of necessity not always summarily removed. Only such portion as is hopeless by clinical determination is removed. When this is judiciously done, an opportunity is given the remaining tissues to regenerate.

The healed wound following gingivectomy invites recurrence of the affection more readily than does the flap operation. In the latter, the part forming the pocket is exposed to view, but much of this tissue is retained. In gingivectomy, the tissues which form the pocket are removed.

I am assuming that by conservative treatment, scaling of the root surfaces, the elimination of traumatic stress and correction of constitutional diseases and dietetic errors are implied. In a larger sense, all treatment in which the teeth are retained and restored to function is conservative. The only treatment which may be termed radical is removal of the teeth. Surgery does not connote radical treatment.

In comparing the various treatments we find that, in all surgical operations, much healthy tissue is further damaged or removed. It is my impression that apoxesis, together with the elimination of other unfavorable conditions, will, in the great majority of cases, yield better and more lasting results. This is partly due to the fact that the tissues are given

a greater opportunity to regenerate and also, through this, the protective relationship determined by the tooth form and the coaptation of the periodontium offers a more satisfactory assurance against recurrence. This is especially essential in those patients whose personal prophylactic measures are for some reason unsatisfactory and when no follow up periodic preventive or corrective measures are exercised. While we admit that in a certain percentage of persons, surgical measures of some form are indicated or may even offer advantages, wherever it is feasible nonsurgical procedures should be preferred.

As intimated above, one of the great objections to the flap operation is that a considerable amount of the viable, some healthy and probably slightly damaged, tissue is removed. Another serious objection to surgical operations in general is that the men practicing this method usually do not periodically follow up their cases with proper scaling and other therapeutic measures. Even though the immediate result is satisfactory, we must recognize that the ultimate result cannot be satisfactory unless the conditions which are responsible for the causation and therefore the recurrence of the disease are kept in constant check. In other words, a case of periodontoclasia successfully treated by surgical means cannot be regarded as permanently cured.

Definite counterindications for surgical measures are: (1) the early stages, when much more can be accomplished and with more conservative means; (2) the advanced stages when there is no longer sufficient periodontium to maintain the teeth firmly in position without resorting to the use of splints, and (3) the presence of local infection, such as Vincent's.

It is difficult to state directly what constitutes a good prognosis as the conception of results is variable when viewed objectively or subjectively. If the etiologic factors are solely or principally local in character, the prognosis is more favorable than in those cases in which endogenous factors are to a great degree or equally responsible for the condition.

In the former type of case, the incipient or early conditions offer a very favorable prognosis indeed, especially in younger subjects. In most cases, the prognosis is inversely proportionate to the depth of the pocket. Beyond this, prognosis is influenced by the local and constitutional predisposing conditions; the degree to which these may be eliminated or corrected; the efficacy of treatment, and the cooperation of the patient. These last two conditions are most important and cannot be compensated for either by the use of drugs or by repeated surgical measures.

THE SUPPURATIVE PERIODONTAL PUS POCKET; ITS TREATMENT BY THE MODIFIED FLAP OPERATION*

By OLIN KIRKLAND, D.D.S., Montgomery, Ala.

IN considering what constitutes the successful treatment of the periodontal pus pocket, it is necessary to draw a comparative mental picture of the investing tissues of the teeth in a state of health, and the same structures after the pus pocket has developed.

In the normal mouth the labial and lingual gingival tissue has an even contour as traced vertically from the buccal fold, or from the palate to the crest of the marginal gingiva, without any swelling or bellying out as this point is approached. The marginal gingiva itself terminates in a thin, knifelike edge. The health of the underlying bone and pericementum is indicated not only by the color of the gingival tissue, but by the firmness of the teeth in their sockets.[1]

When the investing tissues have developed pus pockets, they present quite a different picture. Instead of an even contour of the labial and lingual gingiva, we note a slightly swollen and bulging appearance of the cemental gingiva, with the absence of the thin, knifelike edge of the marginal gingiva, and the gums are congested and purple instead of the light pink characteristic of health. In response to pressure upon the tissue overlying the pus pocket, there is usually evidence of macroscopic pus, and on exploration with a probe, we find a lack of resistance, or the sensation of having passed the probe into a vacuum, indicating the absorption of bone tissue in the pocket. The roentgenogram reveals a rarefied appearance of the alveolar process in such areas, denoting the loss of bone tissue.

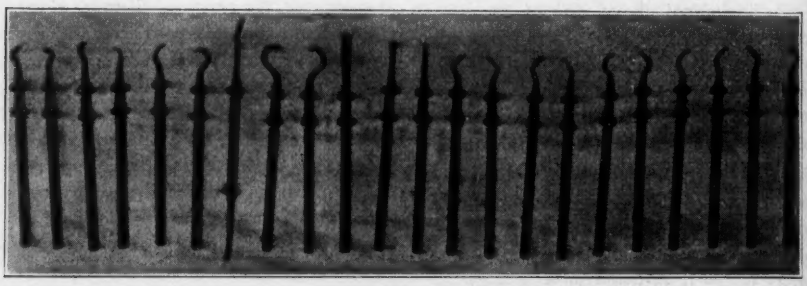

Fig. 1.—Instruments used in the modified flap operation.

In treating the periodontal pus pocket, it would not be reasonable to expect a

*Read before the Section on Periodontia at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 23, 1930.

1. Stillman, P. R., and McCall, J. O.: Clinical Periodontia, New York: The Macmillan Company, 1927.

perfect restoration of the hard or soft tissues involved in support of the teeth to their original form or appearance. The periodontal pus pocket may be considered as successfully treated when the gingiva, after treatment, has become a normal pink and is firm and healthy, with the tooth much firmer in its socket; the gingival crevice, which before treatment admits free entrance of a probe to a cavernous infected pus pocket, changed to one of normal depth with no evidence of pus, and the roentgenogram revealing a slight regeneration and condensing of bone around the tooth.

The first step in surgical procedure in the oral tissues, as in any other part of the body, should be a general survey of the patient's physical condition. The field of operation should be closely observed from roentgenograms, and by local examination, and if the patient's health is a factor, it is good practice to consult a physician and handle the case in conjunction with him. The heavy deposits are then removed, the teeth polished and the gingivae stimulated until the mouth looks clean and reasonably healthy.

As a primary step in the treatment, this not only clears up a considerable part of the infection, providing a cleaner field for surgical procedure, but also discloses to some extent the patient's ability to react to surgical treatment.

At a subsequent appointment, the occlusal relationship of the teeth is given due consideration, and all inharmonious cusps are ground to relieve traumatic stress.

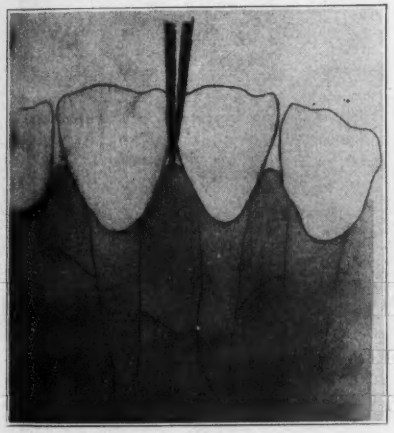

Fig. 2.—Incision through gingival papilla.

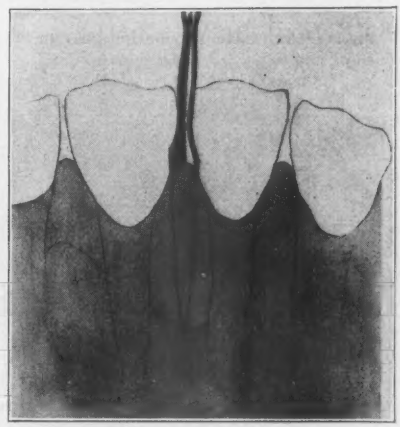

Fig. 3.—Knife at full depth of pocket.

The intensive infection and inflammation having been greatly reduced, the mouth is ready for surgical treatment.

A series of spoon-shaped curets constructed on straight lines and right and left angles, to afford easy access to each tooth surface, and a few selected knives, a periosteal retractor, fork, curved needles, nippers, needle carrier and sutures compose the armamentarium required to execute the operation. All instruments and dressings are made sterile, and hands disinfected.

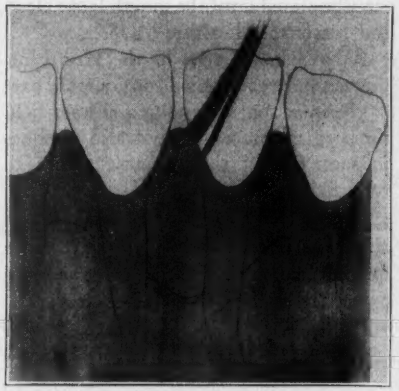

Fig. 4.—Periosteotome entering incision for opening the flaps.

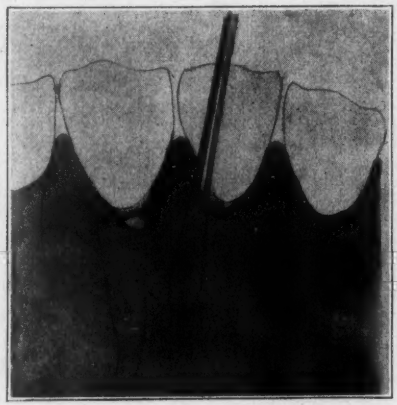

Fig. 5.—Periosteotome at full depth of pocket, and in the act of forcing the flap open.

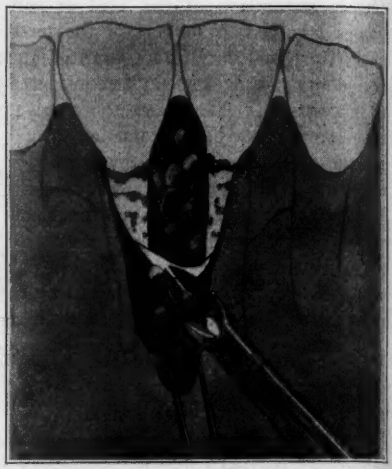

Fig. 6.—Flap retracted, showing nippers removing diseased granulation tissue from inner, or underlying, portion of flap.

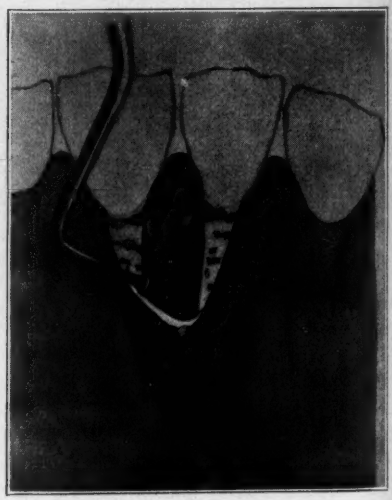

Fig. 7.—Flap retracted, providing free access to diseased substances within the pocket.

After anesthesia has been obtained, the block method being preferred, a small thin-bladed knife is inserted vertically into the gingival crevice to the full depth of the pus pocket, where an incision is made either in a mesial or distal direction through the gingival papilla separating its crest into two parts, so that one half of it may be retracted labially and the other half lingually. This is done with a specially constructed periosteal retractor,

and the gingiva is carefully pushed back until a fork can be inserted into the flap so that it can be drawn back sufficiently far to afford free and easy access for curets, at the same time providing a view into the field of operation.

The spoon-shaped curets are now inserted into the opening through which the infected tooth roots are easily and quickly curetted, and, at the same time, the ragged spicules of bone in the necrosed alveolus can be removed, a clean root surface and smooth healthy bone remaining. The flap is drawn back and, with nippers, the infected granulation tissue is removed, after which the wound is sponged and dried out thoroughly for final inspection, and if any deposits remain on root surfaces, they are visible and may be removed.

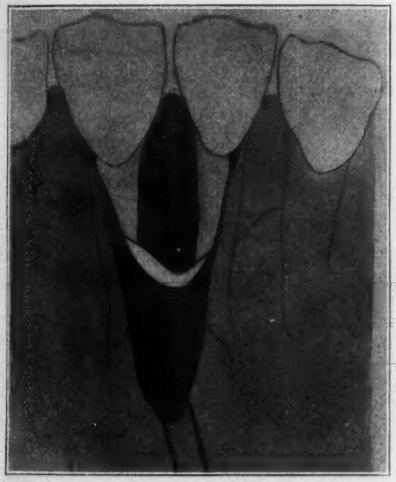

Fig. 8.—Roots of teeth, flaps and alveolus thoroughly curetted and ready for suture.

The wound is irrigated with surgical solution of chlorinated soda (Dakin's) and closed by one suture, using a 0000 fine dermal suture and a curved needle.

After the teeth and gums are dried thoroughly, a wax dressing composed of 1 part sticky wax and 3 parts beeswax is fused and painted over the area of operation with a camel's-hair brush. This dressing should be changed in from three to five days, and if the wound is sufficiently healed, the suture may be removed and the dressing left off, the mouth being cleansed daily with a pressure spray, using physiologic sodium chlorid solution as a mouth wash, the patient being instructed to resume brushing the teeth with gentle force.

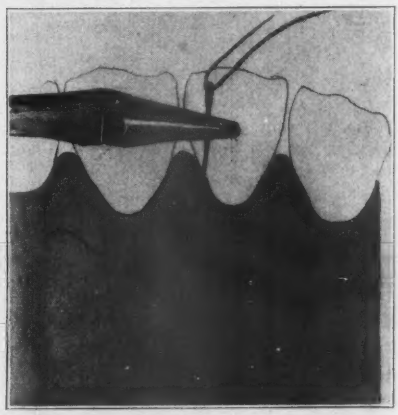

Fig. 9.—Suture being passed through the two flaps, to bring the gingival papilla back to its normal position.

The modified flap operation that I suggest in the treatment of the periodontal pus pocket somewhat resembles the open-view flap operation described by Widman, Newman, Cieszynski, Zentler, Zemsky and Berger, but it is so much less severe in its traumatic effect on the gingiva that it might be termed a vest-pocket edition of the radical flap operation. In fact, the traumatic effect is so slight that there is

no swelling of the tissues, and practically no postoperative discomfort to the patient. At the same time, it provides ample access for instruments as well as observation of all parts of the pus pockets.

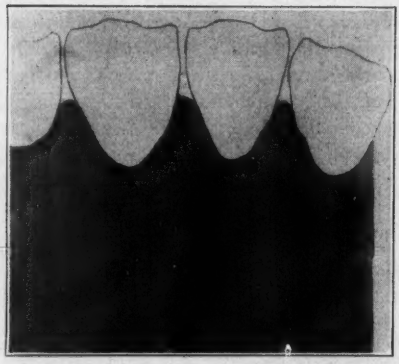

Fig. 10.—Suture drawn and tied sufficiently tight to cause apposition of the labial and lingual flaps.

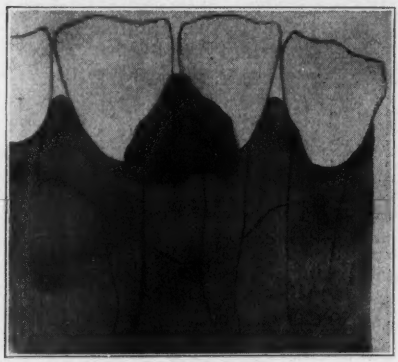

Fig. 11.—Wax dressing spread over the area of operation, after completion of operation.

The plan of procedure in the open-view, or radical, flap operation, provides for retraction of the gingiva to a point at or near the apices of the teeth involved, and in view of the fact that so much tissue must be lifted from the bone, we are justified in the assumption that such extensive trauma must necessarily cause some swelling and pain as a postoperative sequelae.

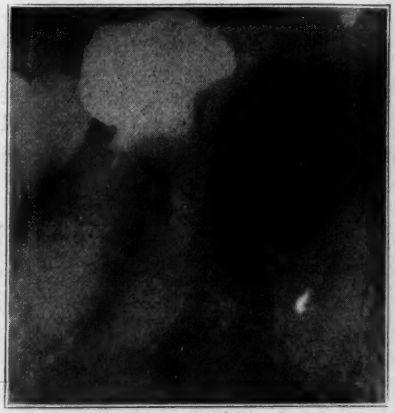

Fig. 12.—Case when treated.

Fig. 13.—Case shown in Figure 12; two years later.

In the year 1866, John M. Riggs emerged into sensational prominence

through his suggestion of a surgical procedure in the treatment of pyorrhea, and much credit is due him for subsequent progress made in handling periodontal disease. The technic practiced by Dr. Riggs resembled the one in use today, known as gingivectomy. This method in the surgical treatment of the periodontal pus pocket is perhaps the oldest surgical technic in vogue at the present time for the eradication of advanced periodontal disease, and, under certain circumstances, this technic may be used to advantage; for instance, when the bifurcations of multirooted teeth are involved, and it is desirable to obtain good drainage.

In the anterior region of the mouth, I do not think it is practical because of the unnecessary sacrifice of gingival tissue.

The gingivectomy operation consists in the complete excision of all the gingival tissues overlying the pus pocket to its full depth. Therefore, on account of its disfiguring effect, I do not think that it is indicated in the anterior portion of the mouth.

The modified flap operation is preferable because it does not require the sacrifice of any gingival tissue, and therefore causes but little if any change in the appearance of the anterior teeth and gums.

Another advantage to the patient in selecting the modified flap operation in preference to gingivectomy is gained through bone regeneration, which is possible, and frequently occurs, in the modified flap operation, but cannot be accomplished by gingivectomy. New bone tissue does not regenerate after gingivectomy because the healthy bone and pericementum are broken down in the bone-smoothing process to the full depth of the pocket, and consequently there is no matrix left to which bone cells can rebuild.

The most popular and a universally practiced technic in the treatment of the

Fig. 14.—Case when treated.

Fig. 15.—Case shown in Figure 14; five years later.

periodontal pus pocket is known as the conservative method, or subgingival curettage, which might be considered a substitute for the Riggs operation, and has been a great comfort to the timid operator. This method gained immense vogue, following in practice the use of the technic of Dr. Riggs, which was too painful to become practical, and consequently failed to gain in popularity; a fact which was undoubtedly due to a lack of knowledge of the use of anesthetics in those days.

Fig. 16.—Case at time of operation.

Fig. 17.—Case shown in Figure 16; eight months later.

The conservative technic appears to be quite simple, but, as a matter of fact, requires greater skill on the part of the operator than any of the other methods in practice, as it must be accomplished entirely through the sense of touch. It is so exacting in skill, except in the early developing stages of periodontal disease, that few practitioners have ever used it successfully or ever will.

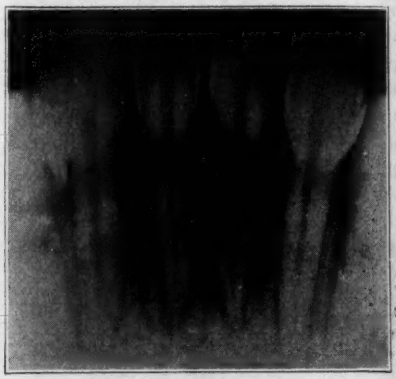

Fig. 18.—Case when treated.

Fig. 19.—Case shown in Figure 18; eight years later.

The procedure is quite often misleading to the inexperienced operator, as well as to his patient, in the treatment of the advanced periodontal pus pocket, because, in removing calculus deposits, it provides sufficient stimulation of the gingiva to afford a healthy outward appearance. The etiologic factors usually have not been eliminated, and the progressive destruction of the investing tissues of the teeth continues in its uninterrupted course.

Fig. 20.—Case when treated.

Fig. 21.—Case shown in Figure 20; ten years later.

It is the opinion of many supporters of the conservative subgingival curettage technic that the infected contents of the pocket should be removed through the gingival crevice, without injury to any of the adjacent tissues—an almost impossible feat. As a matter of fact, the strict observance of this technic is almost as difficult as the removal of the contents of a room through the keyhole. Why not open the door, so to speak, and gain free access to the field of infection, so that it may be easily and completely eradicated? That is exactly what occurs when a flap is turned back, and free access to the pocket is thus provided.

The advantage of the modified flap operation over the conservative subgingival technic lies in the free and easy access afforded to the field of operation, with but slight injury to the gingiva, with an infinitely greater possibility of success, and but little more trauma.

The modified flap operation is contraindicated when disease has not developed sufficiently to cause formation of pus pockets. In such cases, anesthesia is un-

necessary, and we would suggest subgingival curettage instead.

If the bifurcations of multirooted teeth are seriously involved, the modified flap operation is not indicated, and when teeth are in this condition, I would either recommend gingivectomy or extraction. Nor would I suggest the modified flap, or any other surgical procedure, where there is acute spirochete-fusiform bacillus infection. If pus pockets exist, I would operate after the acute stage has been relieved.

In the treatment of the periodontal pus pocket, the youthful patient in robust health is the type most favorable to pleasing results. The periodontal pus pocket that does not embrace more than three surfaces of single-rooted teeth, no matter what the depth of the pocket, provided periapical tissue is not involved, may have a favorable prognosis.

The best results cannot be anticipated with patients in advanced age, or at any time of life when the patient is handicapped by certain diseases that deprive them of the power of resistance.

Pulpless teeth with questionable periapical conditions have a doubtful prognosis. Multirooted teeth with even slight involvement of the bifurcations are somewhat doubtful, though we are justified in operating in such cases.

Patients who are victims of certain specific diseases, such as diabetes and syphilis, that pollute the blood and lymph channels with micro-organisms, are unfavorable cases for surgical treatment.

Pulpless teeth with periapical pus pockets, multirooted teeth with advanced bone absorption in bifurcated areas and single-rooted teeth where more than three-fourths of bone support has been lost may be considered to have a negative prognosis.

Because of the excellent results obtained through surgical treatment of a heroic nature, within the past few years, there has been a rapidly growing sentiment in favor of a surgical operation sufficiently radical to provide for thorough removal of diseased tissue and accumulated foreign matter associated with the periodontal pus pocket.

In the treatment of advanced periodontal disease, I have practiced the modified flap technic for the past twelve years, with results that have been very pleasing to me, as well as to those whom I have served. A great many of the patients so treated have been kept under observation throughout this period of time, and in each case in which the correct operative technic was practiced, and the patient observed efficient home care of the mouth, the results have remained permanent.

It is my opinion that when a definite technic is agreed on as the most practical and positive means of treating advanced periodontal disease, a so-called radical operative technic will be selected. Results already obtained in this field certainly justify a continuation of experimental work in periodontia.

C. W. Hoffer has for several years followed the modified flap technic in his practice, and has made many constructive suggestions in its development.

Shepherd Building.

CORRELATION OF THE SYMPOSIUM ON DIFFERENT METHODS IN THE TREATMENT OF PERIODONTOCLASIA

By ARTHUR H. MERRITT, D.D.S., F.A.C.D., F.A.A.P., New York City

LEONARD defines the conservative treatment of periodontoclasia as one which involves the least possible injury to the periodontal tissues consistent with the elimination of the causative factors. The method by which this is accomplished consists in subgingival curettage of periodontal pockets, removal of mechanical irritants, correction of systemic disabilities, attention to diet and intelligent personal care designed to maintain a high standard of mouth hygiene and stimulate periodontal circulation. The results of such treatment will depend in large measure on the skill with which subgingival curettage is practiced. This consists in removing from the involved root surfaces all calculary deposits, roughened areas, dead pericementum, etc., with as little injury to the cementum as is consistent with thoroughness in operation. This is followed by the correction of mechanical irritants as these are represented by overhanging edges of fillings, food impaction and excessive occlusal stress. Systemic treatment has three main objectives: the maintenance of a physiologically clean mouth, proper nutrition of the periodontal tissues and the correction of any systemic disease which may interfere with the patient's health and resistance. It is admitted that the latter part of the program can, in the light of present knowledge, be put into effect to a limited extent only. The postoperative care of all cases is emphasized by the statement that it may surpass in importance the operative procedure of subgingival curettage. By it, all exposed tooth surfaces should be kept free of bacterial accumulations and the periodontal tissues be vigorously massaged by the proper use of a toothbrush. This is best accomplished by a vibratory motion of the brush, with intermittent pressure on the gum tissues, designed to promote periodontal circulation. Finger pressure and the use of waxed dental silk are also recommended.

A comparison is made of the conservative method of treatment with that of gum resection, and the statement is made that the advocates of surgical procedures entertain a different conception regarding the reaction of the periodontal tissues to treatment. Those favoring gum resection are of the opinion that periodontal pockets represent permanent detachments of the pericementum which cannot be reattached by any method of treatment; hence, the removal of the outer wall of the pocket. The objections to this method of treatment as outlined by Leonard are that it is unnecessary, disfiguring, increases the sensitivity of exposed root surfaces and adds to the difficulty of keeping

*Read before the Section on Periodontia at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 23, 1930.

the teeth clean. It also prevents the reformation of bone about the roots of teeth so treated.

Evidence of successful results of the more conservative operation of subgingival curettage is found in gingivae which are firm, pink and insensitive and teeth that are firmer in their sockets as a result of the formation of new bone about the roots as far as the attached pericementum will permit, as well as in obliteration of the pockets. It is admitted that such results are not always possible by any method of treatment because of conditions not always under the control of the operator. These are enumerated as: difficulty in obtaining a smooth and nonirritating cemental surface, traumatic conditions which tend to irritate and break down the periodontal tissues, the uncertainty of eliminating residual infection, etc. For these and other reasons, it is the author's belief that there is a definite place for surgical elimination of pockets, but such procedure should be the last resort of the periodontist. The paper concludes with the statement that though it is the duty of the periodontist to save teeth involved in periodontal disease, he should maintain his perspective and always act in conformity with the best interests of the patient.

THE MODIFIED FLAP OPERATION

The treatment of periodontoclasia by what Kirkland calls the modified flap operation should bring about obliteration of pockets and regeneration and condensing of bone about the affected tooth roots, and make the teeth firm and the gingivae pink and healthy. These, it will be noted, are exactly the results that are claimed for the more conservative operation of subgingival curettage.

After a careful examination, including a roentgenographic survey, preliminary to surgical interference, the heavy deposits are removed, the teeth polished and the gingivae stimulated until the mouth takes on the appearance of health. In certain cases, it may be desirable to consult with the patient's family physician.

At a subsequent appointment, attention is given to any occlusal adjustment that may be necessary, after which the case is ready for operation. This consists in separating the septal gingivae between the teeth to be operated on to the floor of the pocket; after which, the divided gum tissues are retracted labially and lingually with a periosteal retractor and held back by a fork in such a way as to provide access to, and permit observation of, the operative field. The root surfaces and alveolar border are then curetted and the inner walls of the pockets are cleared of infected granulating tissue, after which the wound is irrigated with surgical solution of chlorinated soda and the divided parts are brought back and held in place with one suture. The teeth and gums are then thoroughly dried and a wax dressing is painted over the operative area and allowed to remain from three to five days. If at that time the wound is sufficiently healed, the wax and suture are removed and the patient is instructed to resume tooth brushing, being careful at first not to injure the tissues operated on. The advantages over those of the flap operation are described as less trauma and postoperative pain and the fact that ample access to the operative field is provided.

It is preferred over the gum resection method in the anterior part of the mouth as being less disfiguring and also because of the advantage to be gained by possible bone regeneration later. The author then compares it with the more conservative operation of subgingival curettage, which he asserts requires greater skill on the

part of the operator than that of any other method. He states that it should be limited to those cases representing the early stages of disease, and, for this reason, he believes that few practitioners ever have been or ever will be able to practice it successfully. He likens it to the removal of the contents of a room through the keyhole and asks the question, "Why not open the door, so to speak, and gain access to the field of infection so that it may be easily and completely eradicated?"

The advantages of the modified flap operation over subgingival curettage are given as: free and easy access to the field of operation with but slight injury to the gingivae, greater possibility of success being thus assured.

It is contraindicated in early cases if pus pockets have not formed and if multirooted teeth are seriously involved. In the latter instance, gum resection or tooth extraction is preferred. Also in cases of Vincent's infection, operative procedures should be postponed until after the acute stage has been relieved. The most satisfactory results are achieved in young patients. Infected pulpless teeth, molars with bone loss in the bifurcation and single rooted teeth where more than three quarters of the bone support has been destroyed are regarded as having a negative prognosis.

GINGIVECTOMY

The treatment of suppurative periodontoclasia by gingivectomy as outlined by Johnson consists in removing the gum tissue to the extreme limits of the pocket in such a way as to expose the border of the alveolar process. Preliminary to the operation, mechanical irritants such as result from defective contacts, excessive occlusal stress and faulty restorations, are relieved, the root surfaces are scaled and a week or two of vigorous gum stimulation is given for the purpose of promoting the circulation. Complete roentgenographic examination is recommended, and an inquiry regarding the patient's tendency to bleed should be made. Under procain anesthesia, a vertical incision is made to the depth of the pocket at each extremity of the operative field, which serves as a guide to the horizontal incision. Where there are pockets involving the proximal as well as buccolingual surfaces, the gum is resected from all these surfaces in such a way as to expose the border of the alveolar process, which is then trimmed sufficiently to present a smooth and beveled surface. The operation having been completed, the exposed surfaces of the roots are covered with a cement-like pack and allowed to remain so for from ten days to two weeks. Irrigation of the operative field should be maintained until such time as the toothbrush can be used. This method of treatment is preferred to subgingival curettage only in those cases in which a wall of tissue prevents adequate cleansing or massage and resection is more rapid and effectual than attempts to reduce it by massage. The flap operation is given preference in the anterior part of the mouth as being less disfiguring. Of fifty cases coming under the author's care, sixteen were treated by a combination of gum resection and subgingival curettage; twenty-four, by subgingival curettage, and ten, by generalized resection. The last method, it is believed, is indicated in but a minority of cases, satisfactory results being obtained in most instances by other and less radical measures. It is contraindicated in all cases in which satisfactory results can be achieved by subgingival curettage, in hemophilia, in cases of impaired health and in the case of patients who will not cooperate in the postoperative care of the mouth.

When periodontoclasia is successfully treated by any method, teeth with at least half of their support remaining should become firm, bleeding cease, soreness disappear and the gingivae hug the roots so closely that an instrument cannot be inserted into the pocket beyond the depth of a normal gingival crevice. When these results are not obtained, the case should be regarded as more or less of a failure.

It will be noted from the foregoing résumé that all are agreed on what may be regarded as successful results in treatment, namely, the obliteration of the pocket and the reestablishment of health in the periodontal tissues. There is also a rather general agreement that when subgingival curettage can be successfully practiced, it is the method of choice, though Kirkland believes that in all cases of pocket formation, the modified flap operation is the more satisfactory procedure.

The lesson to be learned from this discussion of the subject is that each of the methods advocated has its place in the practice of periodontia and that the intelligent clinician is he who carefully studies the case under treatment and knows when to be conservative and when to resort to the more radical measures of surgery, not forgetting meanwhile that the more skilful one becomes in the practice of subgingival curettage, the less often will he find it necessary to resort to surgical procedure.

580 Fifth Avenue.

DISCUSSION

Norman Scism, Walters, Okla.: Dr. Berger mentions reattachment of cementum and of periodontal membrane. I cannot understand that. Dr. Kirkland implies reattachment although he does not make a direct statement. To get reattachment, the cementum and cementoblast must be functioning and functioning normally, in order that the connective tissue will attach itself to these. Otherwise, the epithelial lining will grow down lining the pocket, because the epithelium will not attach itself to cementum normally. As I understand it, when the cementum is once infected, the cementoblasts cease to function. That is according to the histologic findings of Box and others. They state that they have not found a single case in which there has ever been a reattachment of the connective tissue to cementum that was once infected, and they invariably found the epithelium lining this pocket. I cannot understand how Dr. Berger can get attachment where he has a pocket.

Isador Hirschfeld, New York City: In the absence of Dr. Berger, I do not know that I would try to have anybody answer the question.

Arthur H. Merritt, New York City: I think that Dr. Scism has been misinformed. Noyes, in his book, says distinctly that it is possible. Box also, in his studies, illustrates a case which had been treated, as I remember it, by McCall. The tooth was extracted several years later for the insertion of a plate, and attachment is shown. Any man doing a subgingival curettage has over and over again demonstrated that reattachment will take place in many cases, although not in all. There is no question on that point.

Dr. Scism: Dr. Lundquist of Northwestern University made the statement regarding the pocket in talking to me. I told him that I thought I had secured reattachment. He thought that recession had brought the attachment near the gingival margin, but no farther up than it was before.

Dr. Hirschfeld: I have been doing quite a little of this work and may, therefore, tell you from experience that Dr. Lundquist has, unintentionally no doubt, taken a chance in giving you his answer. There are various types of obliteration of the pocket as a result of conservative treatment. At times, what Dr. Lundquist has told you is the case; at other times, we may have attachment beginning from the lateral sides of the pocket and coming toward the center; at other times, an attachment growing from the bottom of the pocket toward the opening of the crevice, and at still other times, we may simply get a close adaptation of the gingiva to the root surface, so close that one can hardly run the finest instrument down between the two. This is my experience, and I am sure there are others in the audience who can corroborate it.

D. R. Miller, Bird Island, Minn.: There was agreement on one particular point, especially in the more radical operations, and that was the need for vision. Tissue is cut away and chances of trauma taken for the purpose of opening the door, so to speak. I want to say that vision can be had by the use of compressed air, from 20 to 40 pounds pressure, blowing the loose tissues away, and assuring translucence. Thus it becomes possible for everybody to be a periodontist. When we see things, we can handle them.

Dr. Hirschfeld: How far down in very deep pockets can you go?

Dr. Miller: The air will blow the tissues apart, except in attachments in bad cases.

Dr. Hirschfeld: The average general practioner should not handle a case in which the investing tissues have receded to the extent mentioned by some of our essayists. This work belongs particularly to the man who has developed the sense of touch and of prognostication that most of us have not attained.

Olin Kirkland, Montgomery, Ala.: I use air in my cases. I first sponge out the area with sterile sponges. I have my assistant take a pair of pliers and sponge out the pocket, drying it thoroughly, drawing the blood out first, of course, with an aspirator. I then blow it out with air. When it is dried out thoroughly, there is no difficulty about visibility. In the early stage of the disease, we can see the deposit on the root of the tooth, but not in a deep-seated lesion. To use air strong enough to assure seeing to the depth of the pocket, is out of the question.

T. Sydney Smith, San Francisco, Calif.: When I stated years ago that the separated soft tissues could be vitally reattached to the roots, permitting the retention of the gum margins at the point where we find them, I was ridiculed very generally throughout the dental world. It is therefore very gratifying to find so many now agreed that a reattachment can be secured. To understand in a measure why some dentists still deliberately remove the gum tissue, we must bear in mind the fact that while the form and function of the teeth have been described in detail, and great stress has been laid on the need of retaining contact points, there has been far too little value placed on the gums. They must be normal in form to perform their function. The first case of reattachment of the tissues complete enough to restore the gingival sulcus to its normal depth was secured by me in January, 1903. Since then, I have been able to observe many of these cases of reattachment for a period of over twenty years, and have found that the restored gingival sulcus remained normal in depth, with all the tissues in perfect health. For the benefit of any who may doubt the possibility of a reunion of the tissues, I shall refer briefly to the evidence of reattachment and rebuilding of bone in very advanced cases presented by me at the meeting of the American Academy of Periodontology two years ago. In one case, not only had the pocket extended beyond the end of the root of an upper central incisor, but also the apex was badly absorbed. Much of the involved cementum had been removed, leaving the root hypersensitive, as the pulp was still vital. After thorough surgical treatment, performed gently and without an anesthetic, the tissues reunited rapidly, and enough new bone formed to give the tooth sufficient support. I wish to emphasize the point that there was no recession of the gums following the treatment. This patient permitted me to present her case last year at the Pacific Coast Dental Conference. There are several men present who examined the tooth at that time and can testify to its firmness. The kind of surgery that cures these deep pockets must be so accurate and gentle that the patient will experience but little discomfort and have no after-effects the following day. If one were to attempt to see the deposits while removing them, it would be necessary to press the tissues too far from the roots. This pressure would prevent rapid healing, and allow the root to become coated with débris. Let me ask whether any of us present would submit to having his own gums cut off. It is not honest to ruin the patient's mouth just because we have not sufficient training to do the right kind of work. My first vital attachment to tissue was secured twenty-seven years ago last January. I have followed these cases where attachment has been secured, where the gingival sulcus was just the normal depth, and the gingival sulcus year after year for twenty years has remain healthy. I ask you—which would you prefer in your own mouth? The tissues operated on gently and reattached to the roots and to the gums at the point where they can function, and if you would like that in your own mouth, why not assure it to the patient? If you haven't the skill to do that.

why attempt to do a thing that only ruins the patient's mouth?

Dr. Merritt: Dr. Kirkland made the statement, which is frequently made, that Dr. Riggs approved of surgical measures in the treatment of these cases and did, as I understood Dr. Kirkland to say, the operation known as gingivectomy, or gum resection. That is incorrect, and I can furnish any one who wishes it the proof of this statement. Dr. Riggs, as you know, was one of the pioneers in periodontia. He devised his own instruments, which were six in number. They were coarse and clumsy and, by modern standards, one wonders how he did anything at all with them. Naturally, since Dr. Riggs used instruments of that size, and believed, as he did then, that a certain amount of curettement of the alveolar border was necessary, the operation as he performed it was attended by no little pain. Levi C. Taylor, of Hartford, who was at one time associated with Dr. Riggs, once told me that he had seen Dr. Riggs operate many times, and frequently, because of the severity of the operation, he had found it necessary to use chloroform because, in those days, local anesthetics were not used.

Dr. Kirkland: I want to thank Dr. Merritt for correcting my statement concerning Dr. Riggs. I wrote to the library of the American Dental Association and asked for all the literature that had ever been written on the surgical treatment of periodontal disease. I asked especially for any data that had been contributed by Dr. Riggs. The librarian sent me no literature, stating that according to Dr. George A. Mills, in the *Independent Practitioner* for 1887, "In 1875, Doctor Riggs. . . . read a paper embodying his views on the pathology and treatment of this disorder. This paper was published in the *Pennsylvania Journal of Dental Science.* As far as I know, this was the only article ever published over his signature distinctly embodying his views on this subject, although at different times he in part reiterated them."

Dr. Merritt: I know of his having written but two, one of them published in *Dental Miscellanies* in the seventies and one in *Dental Cosmos* in the early eighties.

J. M. Gray, St. Louis, Mo.: Dr. Black says that there is no such thing as reattachment of tissue. I have heard Dr. Bunting say that he can positively prove it. Disregarding what each of these persons thinks, we should remember that none of us can be sure.

E. E. Monson, Salt Lake City, Utah: I want to ask Dr. Johnson if it has been his experience in some of these gingivectomies to find cases in which part of the tooth that is uncovered is so sensitive that it is quite unbearable to the patient, and what his method of treatment is in such as case, if he has one.

Raymond E. Johnson, St. Paul, Minn.: That does happen quite often with posterior teeth. On an anterior tooth, I use formaldehyd rather than silver nitrate. I have used that the last few months with quite gratifying results. On posterior teeth, I use silver nitrate with powdered amalgam. This does make the tooth dark and unsightly, but in the posterior part of the mouth, that does not make so much difference. Another thing I have used with good results is the dentifrice powder recommended by Harold K. Box in his last book and originated by Andresen of Copenhagen. I have a number of patients using it. It is supposed, as he states, to bring about demineralization of the cementum.

Dr. Monson: Silver nitrate works [illegible] in the posterior part of the mouth, but what about the formaldehyd in the anterior? How do you use it?

Dr. Johnson: I use it as I do silver nitrate, drying the tooth, isolating it and inserting the saliva injector, warming it with the chip blower as one would in using silver nitrate. I use it full strength.

S. R. Parks, Dallas, Texas: Dr. Merritt refuses to take issue with the statement Dr. Johnson made. He does not disagree except as to the method. In his book he states that the method is to gently rub with a polisher of soft wood material on the sensitive surface of the tooth.

Dr. Johnson: I apply the silver nitrate with a porte polisher with a flat wood point. I think that sensitiveness of the necks of teeth can often be overcome by prophylactic work and ideal toothbrushing. I do not think that ordinary toothbrushing will keep any mouth clean.

Maxwell Dixon, Los Angeles, Calif.: Fauchard, in 1757, gave what we call the surgical treatment of today. From the descriptions given by these men from various parts of the country, their surgical treatment is similar to Fauchard's. Especially in the earlier stages, favorable changes can be obtained in the patient's oral condition from proper feeding. This the periodontist must recognize in whatever method he may use.

GOLD FOIL*

By JAMES MARK PRIME, D.D.Sc., F.A.C.D., Omaha, Nebr.

THE teeth are perhaps the most vulnerable part of the human body. They require more attention and care than any other part. It is rare indeed to find a mouth free from some stage of one or both of the two principal diseases that destroy the teeth. Their inception is stealthy, subtle and painless. Both are primarily diseases of the teeth. They can exist only when teeth are present. When the teeth are removed, both diseases disappear at once. Were it not for these two diseases, the teeth would, with our present grit-free foods, last throughout our life span.

Few are the people who reach the "three score and ten" mile post with a full complement of teeth. Much as the teeth are needed through the entire span of life, few people are able to keep them. Most of the other organs, barring accidents, are kept in fairly good working order through the full span of life. Even though we are provided with two sets of teeth, our bodies usually outlast both sets.

Until science came to our aid, people were losing their teeth before middle age. Now, with this knowledge and if permitted to apply it properly, we are able to keep the teeth and oral tissues in a state of health through most of the life term.

Any method of treatment, be it medicinal, mechanical or nutritional, demonstrated over a period of years to best aid us in preserving the teeth, deserves our most serious thought.

Millions of dollars have been spent by the dental profession during the past decade in an effort to prevent the loss of the teeth, or improve the substitutes employed when they are lost. Organized dentistry is awake, alert and progressive. Conventions are being held in every city, large or small. So numerous are they that we are beginning to grow tired of them. If we see a dentist away from home, we may be quite sure that he is either going to a convention or returning from one.

From it all, we have accomplished much, but dentistry is far from its goal as long as the two most prosperous men in the town are the exodontist and prosthodontist. A greater value is being placed on the service of removing teeth and putting in substitutes than on restoring them to health and keeping them in that condition.

Which is the greater servant—the surgeon who skilfully removes the cataract and restores the vision and health to the eye or the surgeon who removes the eye and substitutes the artificial one? It is, or should be, the chief business of the dentist to restore teeth, wherever possible, to health and keep them in that condition. Shame on dentistry that would place a greater economic value on the

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 22, 1930.

removal of a tooth than on restoring one to health.

This "convention age" is making unquestioned advances in certain lines. One of the most important is in the knowledge of food values. While much remains to be learned, certain fundamental truths are pretty generally accepted. A better understanding of the diseases of the periodontium has resulted in advances in periodontia and oral prophylaxis. Oral surgery, orthodontia, full and partial dentures and the casting process came in for their full share of progress. It is my opinion that some of them claim more progress than they have really made—time will answer that. Can we say that operative dentistry has made its full share, in all its phases?

In one of its major aspects, has it not failed to advance and also fallen miserably behind? The single fact that gold foil has lost its place in most of the dental offices constitutes an indictment not easy to set aside. Twenty-five years ago, there were thousands of operators in America whose pride it was to excel in gold foil operations. These operations were the *ne plus ultra* in their dental achievements. Could you imagine G. V. Black or McKellops, or a host of others of that day, filling the anterior teeth with cement and leading their patients to believe it permanent work?

Look at the front teeth of the average patient of today and contrast what you see with what might have been seen twenty-five years ago. Then ask yourself, is operative dentistry advancing or retrograding?

All this is done under the name of esthetics, and for the time being we grant the point. It is purely temporization. The operator should vision the results in a few years, when the contacts are lost, the teeth have moved together, the interproximal spaces are gone, the septal tissues are lost, and teeth and fillings are discolored. Then comes the loss of the teeth, which means not only their loss, but also that of the alveolar process, with its sunken lips and distorted facial contour, aided and abetted by a display of gold on abutments and long ugly porcelain facings. The operators desire esthetics and finally get everything but esthetics. The urge on the part of the operator to perform the operation quickly and easily and, the fact that he has never developed the ability to handle gold foil have greater weight, more often, than a desire for esthetics.

At no time since the advent of the cast gold inlay has there been such an interest in gold foil. From all parts of the United States comes the request for papers and clinics on this subject. This renewed interest in gold foil is a compliment to the profession, especially since it comes at a time when the cast gold inlay has reached a high degree of excellence. It reflects the fact that dentists are not wholly satisfied with what they are using in lieu of gold foil. They recognize that there is a definite place, though limited, for this material.

The answer to this demand for more knowledge on this subject should be constructive discussion by the editors of our journals, and the encouragement of gold foil study clubs. A helping hand in teaching from the dental trade in this association, as along other lines, would be a great help.

Gold foil needs and deserves a good campaign of advertising. A little time and money spent in learning the technic will return greater dividends than anything of which I have any knowledge. As business in all lines is below par, now is a good time for study work along this line.

If the operator desires to increase his income, let him get a pair of Beebe's binocular loupes and have them fitted to his eyes. After the saliva is blown off the occlusal surfaces with much force, the bicuspids and molars are examined with a sharp explorer for pit and fissure cavities. If, after he finds them, he will fill them with gold foil, it is not too much to say that he will double his usual operative income, by this one procedure alone. And think of the blessing to the patient. The proximal surfaces should likewise be dried and examined. Holding a mouth lamp on the lingual side will usually help.

There would be less complaint about dental incomes if the average man would find the work that should be done for the patients who come in for service, and then do it.

The operator not using foil is comparable to a farmer denying himself one of the very important farm machines. He would find himself trying to make the plow do the work of the harrow, or the harrow do the work of the plow. It is evident that he could accomplish better results if he had both tools.

It is surprising how few men have a grasp on a dependable method for foil operations. This fact can be ascertained best by doing class work over the country. The questions asked reveal the lack of information. If the questioners learned it in their college course, they seem to have completely forgotten it. Is it any wonder, then, that men do not do foil work? If they have not made an inlay since they were in college and have no casting machine in their offices, should we expect them to be interested in and do good inlay work?

There seems to be little unified thought along this line. "Do you use the rubber dam?" "What do you mean by class three cavities?" "What is soft foil?" "Do you use hand force or mallet force?" These are common questions.

I am told there has been no effort at unifying thought among the schools. Each teacher of foil is a free lance, and probably teaches what he was taught in college.

One of the common errors in teaching the student is to have him attempt to fill large cavities, either those made large by extensive decay or by the extending of cavities, until the student faces an almost impossible task. This results in discouragement, and the student resolves then and there to do only enough to get through school and past the examining board. Thereafter, he proceeds to forget the little that he learned about it.

This excessive cutting not only makes for a larger and more tiresome operation for both patient and operator, but it also invites tooth fracture, discoloration, display of metal and, worst of all, death of the pulp.

There is a strong tendency on the part of the operator, when these extensive, ill-advised operations are undertaken, to hurry through them, undercondensing the gold; which will surely make for a pitted, ugly filling, and perhaps cause a leak, discoloration and failure.

There is really no excuse for this state of chaos. Dr. Black gave us his work on operative dentistry twenty-two years ago. It has been available all this time; yet how few men know what is in it. Scattered over the country are a few operators thoroughly grounded in this technic, and I can think of none who have abandoned it, unless from ill health or eye trouble. Most of them become more and more enthusiastic. Improving their technic and seeing other methods fail increases their faith in foil and their love of handling it.

What are we going to do? Shall we stand idly by and let bad conditions grow steadily worse? Or shall we take advantage of the present wave of enthusiasm and join hands in bringing gold foil back? I think that our journals stand ready to help. We must not limit our efforts to essays. It takes more than conversation to teach any technic. That of the gold foil operation is no exception. It must be done by writing, giving table and chair clinics, and finally by doing study club work.

The start is simple and easy, but you must be sure to start right. Organize by carefully selecting ten or fifteen men, men with vision, not afraid of work. Select a demonstrator who knows the technic and how to teach it. See that he starts on the simplest cavities, and continues on these for at least one year.

It is a good plan to meet one evening each week, in an office having two chairs. Two operations should be carried out at each meeting, beginning at 6 o'clock and continuing until 8.

My sympathies go out to the gold manufacturer. He tries to cater to all whims, with the result that he has to put gold out in very limited quantities in many forms, which adds materially to the cost of manufacture and sale. He is making as good or better gold than ever before. If the gold foil operators generally could agree on one form of gold, substantial savings could, no doubt, be made.

There seems to be a consensus of opinion that No. 4 soft gold is the most desirable form. There seems also to be good reason for this. It is the most economical form, and provides both soft (noncohesive) and cohesive in one form. It comes in books of one-tenth ounce. Each sheet weighs 4 grains, hence the name "No. 4." It is prepared by the assistant while the dentist is out of the office, and it is used in two forms: one in cylinders rolled on a Swiss broach one-fourth, one-half, three-fourths and one sheet each; the other in round pellets, hand rolled, one-ninth, one-sixteenth, one-twenty-fifth, one-thirty-sixth, one-sixty-fourth, one-one hundred and twentieth and one-one hundred and forty-fourth of a sheet. This provides all the necessary sizes for the pellets. The cylinders are always used in the noncohesive form. The pellets are rarely used in any but cohesive form.

When this No. 4 soft gold is annealed, it becomes cohesive. When it is not annealed, it is not cohesive. Hence, the advantage in having both the cohesive and the noncohesive form in the one gold.

Why may we not use the gold as prepared by the manufacturers, and supplied in bottles? First, because the hand prepared gold is much better, meeting the requirements admirably; secondly, a material saving is effected, for the obvious reason that the manufacturer could not, except at added expense, prepare the various sizes mentioned above and put them in separate bottles. There are other good reasons, one of which is that opportunity is offered to keep the gold constantly bathed in the fumes of spirits of ammonia, as suggested by Dr. Black.[1]

The gold is best annealed in the open alcohol or gas flame. Each pellet is speared with a small sharp point such as a small sewing needle, held in a broach holder. The electric annealer is equally effective, but it has some objections which it is not necessary to enumerate here, but which experience will demonstrate. The open flame will be the one of choice after long experience with both methods.

I am frequently asked what method I use for condensing gold. To this, my

1. Black, G. V.: Operative Dentistry, Vol. 2, pp. 229-230.

answer is always that given by Dr. Black.[2] Dr. Black made the most exhaustive experiments ever conducted to determine the best method for condensing gold, and I could offer no better method than that advised by him. The hand mallet in the hand of the assistant, combined with hand force by the operator, surpasses the mechanical mallet, the automatic mallet and the mallet used by the operator in one hand, while holding the plugger with the other. Malleting by the assistant is best. The use of the automatic mallet comes next, and lastly the employment of the hand mallet by the operator himself.

With the assistant malleting, better results are almost certain. The operator may give his whole time to the line of force and stepping the plugger. He may increase or decrease his hand force at will and, at a signal, the assistant decreases or increases the speed, and also increases and decreases the force of the blow.

Thoughtful dentists are beginning to realize the value of closing a clean cavity with sterile gold, fresh from the flame. They also are seeing the value of a material which may be wedged against enamel rods and hold them on walls. Especially at margins, it is the material par excellence.

While the use of the foil filling can never be classed as a fast method, in many cavities much time may be saved over that demanded by a cast gold or porcelain inlay.

In classes one, three, and five, it is a tooth conserver, as well as a tooth preserver. In the hands of experienced operators, it will, in many cavities, prove to be a saver of time, tooth structure and labor, with a result much better than can be secured by any other method. Deep cutting is, as a rule, quite unnecessary. Cavity preparation involves the adaptation of certain well proven principles to constantly varying conditions.

2. Footnote 1, pp. 251-252.

CONCLUSION

1. As an aid to unify thought on gold foil technic; to bring operators together from all over the country to compare work, to discuss instruments and instrumentation, golds, cavity preparation, etc., and to assist, if possible, in bringing about a more uniform teaching in our schools, I suggest that we organize an academy to meet at the same time and place as the American Dental Association. I suggest that we take some such name as the Academy of Gold Foil Operators of America.

2. Some improvements should be made in our methods of selecting essayists and clinicians. As it is, it would appear that our greatest desire is to fill a program. Programs are too full. We should have half as much and twice as good material.

Before a man is asked to appear on our programs, either national, state or district, his work should be investigated. An impartial inspection should be conducted to see if his dentures work and his gold foil fillings last. In other words, he should not be allowed to take the time of men who are spending their time and money to attend the meeting unless he knows his subject and has been successful in his practice.

DISCUSSION

C. N. Johnson, Chicago, Ill.: Dr. Prime gave expression to a profound truth when he intimated that if as much application and ingenuity had been expended in an effort to preserve the natural teeth as had been devoted to the insertion of artificial substitutes, the result would have redounded to an infinitely greater benefit to the profession and the people. There is always a question as to the efficacy of bridges and dentures, but there can

be no question as to the value of the natural teeth when preserved in a state of health and efficiency. Filling teeth may not make such a spectacular appeal as constructing prosthetic restorations. Neither may it be considered quite so profitable financially, but when it comes to an estimate of the real value to the patient, there can be no comparison between the efficacy of the natural teeth and that of artificial substitutes. After all, the prime consideration in our service to the people should be the ultimate welfare of all whom we serve, and the matter of our own convenience and profit should never sway us in the character of service that we deliver. Dr. Prime has naturally emphasized the virtue of gold foil over other filling materials. I think that he has not overstated the matter in any particular. But what interests me most is that the natural teeth shall be saved, and I care less for the particular method that is used than I do for the fact that the teeth are preserved. In other words, while I think with Dr. Prime that there is no other kind of filling material so reliable as gold foil, at the same time I will not argue with men who feel that they can do better service with some other kind of restoration, such as amalgam or gold or porcelain inlays. As a most enthusiastic gold operator, I cannot but lament the lessened technical skill of the members of our profession through the neglect of gold foil operations. It is a common expression with me in teaching students to argue that even if the graduates never use gold foil in practice, insistence on the manipulation of foil in our college is well worth while on account of the technical training alone. A man is a better operator in every department of his work if he perfects himself in gold foil manipulation. Especially in educating students, this kind of technical training is of immense value. American dentistry would never have achieved the commanding position which it has for many years enjoyed had it not been for the insertion of gold foil fillings. These gold restorations in the natural teeth not only served the patient acceptably, but also raised operative dentistry to a status that could never have been achieved in any other way. I should like to correct one impression that might be gained from listening to Dr. Prime. There seems to be a widespread opinion that colleges are derelict in their duty in not properly teaching gold foil filling. I have a pronounced opinion that there are few colleges that do not emphasize gold foil in their courses. I can speak at first hand only of my own department, and in the practical requirements in that department, there is a larger relative number of credits required in gold foil than in any other operation. This has always been the case, and I trust it always will be. As I view the situation, the greatest factor in the present "slump" in foil operations is not only the attitude of the profession, but also and in particular it is the attitude of the patient. Recognizing our present-day tendencies, we cannot ignore the fact that the average patient will demand an operation that is less taxing than the insertion of foil particularly in cavities of appreciable extent. I think probably most members of our profession who are obliged to be patients themselves will be inclined to lean toward inlay work rather than foil on account of the greater tax on the patient with foil than with inlays. In other words, I fancy that some of our enthusiastic gold-foil operators may be found rather hesitant to take their own medicine. In any event, most of the patients will insist on having gold inlays inserted rather than foil fillings of any appreciable size. There is one angle to this question that has always appealed to me. I cannot escape the conviction that much of the dread of ordinary foil operations has been developed as the result of lack of skill in the manipulation of foil on the part of many of our operators. Foil fillings not too great in extent may ordinarily be inserted without serious tax on the patient, provided the utmost precision and gentleness are used in inserting the gold. In other words, bungling on the part of the operator is accountable for some of the prejudices against gold on the part of the patient. I should like to add a word to what Dr. Prime has said in connection with the failure of too many essayists and clinicians to give the proper preparation to their presentations in advance of the meeting. A great deal of time is wasted by ill-prepared essays and ill-arranged clinical demonstrations. There is a real obligation on the part of an essayist or clinician when he consents to appear before a dental society that he shall have sufficient respect for the members to have devoted the utmost care to the preparation of his subject.

George M. Hollenback, Los Angeles, Calif.: It has been my pleasure in the past to discuss other papers on this subject, one of which was written by Dr. Prime. It has always

seemed to me that I have been singled out to do this because of the mistaken idea that I am an advocate of other operative procedures and am in no sense of the word a devotee of gold foil. I wish at this time to go on record as one who firmly believes that the proper use of gold foil represents the highest achievement in operative dentistry. There is no other material which will approach it when used under the right conditions. For many years, there seemed to be considerable justification for the belief that the cast inlay would almost completely supersede the foil restoration. Experience, the greatest teacher of all, has shown us the fallacy of this. The passing of time has left the majority of well-placed foil restorations standing as firm as the rock of ages, but it has had a disastrous effect on many cast restorations. As one who has studied and observed sympathetically the cast restorations for nearly a quarter of a century, I feel that I have at least some right to speak with authority. The weakness of the cast restoration is the cement used in setting or sealing it in the cavity. All of the cements on the market today disintegrate to a greater or less extent in the oral fluids. I have had occasion to remove hundreds of cast restorations, some excellent, some very poor, the majority mediocre. Not in a single instance where the restoration has done service for any considerable length of time have I failed to find evidence of disintegration of the cement. This disintegration must inevitably, in the course of time, cause leakage, followed by infection of the dentinal tubuli and recurrence of decay, with all of the sequelae this entails. The technic of construction of cast restorations has reached a high degree of perfection as far as marginal adaption and anatomic restoration is concerned, but until we have at our command a better cementing medium, we must expect a high percentage of failure coincident with its use. I do not wish this to be understood as wholesale condemnation of the cast restoration; I am merely trying to point out in a fair and reasonable way its great weakness as I see it. In every other regard, it has shown a fine record of service and, when correctly used, it makes a restoration second only to gold foil. The mastery of gold foil technic is regarded by the majority to be exceedingly arduous and difficult, but it is probably no more so than that of the cast inlay and many other technics with which we are all more or less familiar. If one half the time and effort had been expended on gold foil technic as has been expended on developing the cast restoration during the past twenty years, our profession and the public would have been greatly benefited. Gold foil, as Dr. Prime has intimated, is the material *par excellence* in small and incipient cavities. Its use entails less cutting than other materials and its expectancy of long service is much greater than any other. By periodic roentgenographic examinations of the approximal surface of the teeth of our patients, using Rape's bite-wing films, it is possible for us to detect cavities in their incipiency and to make restorations with the very minimum loss of tooth tissue, and needless to say gold foil is the material which should be used. The suggestion that an academy of gold foil operators of America be organized is a most excellent one, and I hope it will not languish. The dental profession needs to be awakened to the importance of operative dentistry, the very bulwark on which our profession is founded, and establishment of this proposed academy should have the desired effect.

Dr. Prime: Dr. Johnson has stood firmly on the ground that gold foil ranks first among our filling materials. He never fails, when opportunity offers, to reaffirm his faith in it. The younger men of the profession will do well to harken to his words of wisdom. We must not lose sight of the fact that a dental college training, be it ever so thorough, in any line of work, is only a beginning. This applies particularly to gold foil work. We did not realize this on graduation day, but we soon learned that we lacked that most valuable training of all, which comes with experience. The rank and file of the profession are not using gold foil. I find in coming in contact with them, through study club work, that they lack the fundamental ideas necessary to do it successfully. There are a few exceptions, to be sure. My thirty years of foil experience, fifteen years in a small town practice and fifteen in the city, forces me to take exceptions with one statement of Dr. Johnson's. In all these years, I could count the times on the fingers of one hand when a patient objected to gold foil. Some have justly objected to the appearance of gold in the front teeth. In this, I am compelled to agree with them. It has been rare indeed that one has objected to the malleting. Many of these patients have been dentists. In

my early experiences, when I used the automatic mallet, I recall some complaints and I certainly would not blame a patient for objecting to the malleting from one of those instruments. If we do not use foil, we should not lay it to our patients. As I see it, the reason for the "slump" in foil lies squarely at the door of the dentist. He is using silicious cements in the front teeth where he should be using foil. He is putting cast inlays and amalgam where foil would be better. The idea exists with some men that gold foil technic has not kept pace with other lines of progress. This is because they have not investigated the subject. They do not know that cavity preparation, without injury to Black's principles, has been modified; that methods for condensation have been developed with lessened strain to the peridental membrane; that instruments are now available giving access to the most distal portion of the mouth. Any dentist wishing to inform himself will find many reasons why foil is gaining in popularity. Dr. Hollenback, we are pleased to hear, agrees with Dr. Johnson, in his unstinted praise of foil.

PROCEDURE IN EXAMINATION FOR PERIODONTOCLASIA*

By GRACE ROGERS SPALDING, D.D.S., F.A.A.P., Birmingham, Mich.

THE purpose of this paper is to stimulate an interest in those measures which are essential to a satisfactory examination for periodontoclasia and to present a plea for their simplification.

Although the tendency of today is toward elaboration of methods for examination and treatment of disease, it is not economically justifiable, from the standpoint of the patient, to complicate professional services. If the professions of healing have really a humanitarian objective, they will not block the outlet for their benefits by elaborating diagnosis or treatment, since it inevitably involves an economic problem and restricts the number served. While it is true that there are certain standardized diagnostic steps the value of which is indisputable, there are many others which can be eliminated with mutual benefit to the diagnostician and the patient. Clinical experience, wisdom, observation and judgment will need to be substituted for these superfluous measures, while the exercise of intelligence can often, figuratively speaking, remove mountains of red tape in diagnosis. W. C. Rappleye, in a recently published article on medical education, writes as follows: "The many services provided for the diagnosis and care of hospitalized patients, for investigative work and hospital records are all important for their several purposes, but the intern should not be taught that all these are necessary for the care of every patient. There is a strong belief that much is done in the hospital period to make the student unwilling or unable to practice medicine in communities where all or most of these special services which he has come to regard as necessary for practice are not available." In other words, the intern has become so dependent on specialists, nurses, laboratory workers, dietitians and other aids that he has not sufficiently de-

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veloped his personal judgment and ability to make decisions. The fewer the crutches upon which the medical or dental practitioner leans in determining the nature of a disease, the greater will be the necessity for developing keenness of perception, and an increased consciousness of conditions unattainable by those who have acquired the habit of placing their dependence largely on means outside themselves. The periodontist will become a better diagnostician in his field if he will but place less reliance on outside aids such as roentgenograms, casts, chemical analyses and medical diagnoses than on his own ability to perceive, correlate and evaluate variations from the normal of the teeth and supporting structures, and their relation to periodontoclasia. When it is feasible, these aids should be used to any extent that the severity of the case demands. The foregoing statements are not to be interpreted as discouraging the use of outside measures, but rather as suggestions to counteract the empiric statement that they are essential in every case, and to encourage more frequent personal observation of easily recognizable symptoms.

The purpose of an examination for periodontoclasia is to determine primarily whether it is present; secondarily its extent and specific nature, and finally its prognosis and method of treatment. The value of the examination will depend on the dentist's ability to recognize deviations from the normal in dental and periodontal tissues, his estimation of these abnormalities as etiologic factors and his judgment and skill in diagnosis and treatment. Any attempt to discuss examination procedure for periodontoclasia should take into consideration the great variation in types of practice, whether conducted by specialists or by general practitioners, localities, whether city, town or country, and clientele. Opinions presented, therefore, must be purely suggestive. The subject is further complicated by the fact that, because of the contiguity of the teeth and periodontium, their unity in function and their interdependence in health and disease, general oral diagnosis, and often medical diagnosis as well, is involved. Nevertheless, I shall attempt to adhere to it as nearly as possible.

Before any examination is made, the dentist has a psychologic obligation, that of inspiring confidence. The average patient who is suffering from periodontoclasia is discouraged and is looking for someone on whom he can pin his faith, for the salvation of his teeth. To convince him at the outset of a friendly interest, not in a case but in him as a patient, is worth while in securing his complete cooperation later. He will be freer, then, in giving personal information concerning his recent life history, which may include operations, long periods of illness, poor health, great griefs, mental shock, accidents or worries, all of which can materially modify a diagnosis as well as a prognosis. Not every periodontoclasia patient is necessarily a potential medical case, so that any information concerning his life history, interests and activities are invaluable when we are attempting a correct diagnosis, and in guiding our procedures of examination.

It is of importance to know also whether the case has had previous treatment, since it may be destined to failure by having already been ministered to by inexperienced or overzealous root-planers or traumatic-occlusion enthusiasts. Those patients who have been harmlessly and indifferently treated at regular intervals over long periods are excusably disheartened concerning their teeth, and their state of mind must be changed to a

hopeful one as quickly as possible, if the prognosis warrants it.

An important piece of information also to be furnished by the patient is his own case diagnosis, with emphasis on the symptoms. This often will furnish a guide as to the sequence of steps in treatment as well as a record for future reference. The way in which the condition first manifested itself and how long since may be indicative of the type of case. If a patient is suffering pain or discomfort, the first step is his relief, regardless of routine procedure. As a rule, our most loyal patients are those for whom we have had the privilege of relieving pain, and it is a well known fact that there is no more spectacular way of winning patients' gratitude than to relieve them of pain; so whether we consider it from the standpoint of dental economics, psychology or humanitarianism, this should be our first service.

Arthur H. Merritt has stated that the economic problem of dentistry and periodontia would be solved by the early recognition of dental and periodontal disease; and, hence, that it is impossible to stress the importance of the latter too often or too emphatically. The first visible indications are a change in the natural form, color and tone of the gingivae and the relative position of the gingival margins and interdental papillae. Another easily detected symptom is unusual mobility of one or more teeth. An examination of the gingival crevice to discover detachment of the periodontal membrane is important and should be made with a small instrument, well adapted or adaptable to the subgingival surfaces of the teeth. Gentle pressure over the root areas will readily disclose the presence of macroscopic pus, and ready bleeding of the gums, indicating abnormal conditions. With these simple observations, one can recognize the majority of cases of periodontoclasia from their incipiency to an incurable stage. It is claimed that some conditions are revealed by the roentgen rays that are not otherwise discernible, but I believe that few cases escape the keen observer who is experienced in the treatment of periodontal lesions and sensitive to all deviations from normal. Since the story told by the roentgen rays is, at best, a partial one as far as periodontoclasia is concerned, it is as absurd to make a diagnosis of periodontoclasia from roentgenograms alone, although it is frequently done by both dentists and physicians, as it is to diagnose periapical conditions without them.

Before an examination has progressed farther, it is desirable to clear the field and to reduce the bacterial count. This can best be accomplished in most cases by mechanically removing all deposits from the exposed surfaces of the teeth, as well as those lying immediately beneath the free marginal gingivae. Instruments used for this operation should be of such size, shape and adaptability as to be efficient, but, at the same time, cause the minimum amount of laceration, if any. When one cannot operate in what might be termed a normal gingival crevice without laceration of tissue, he is certainly not sufficiently skilful to operate conservatively and successfully in periodontal pockets where the cementum and alveolar process are involved. The oral tissues heal rapidly and are not easily infected, which accounts somewhat for the lack of consideration for them. We have all seen the results of such abuse even in the mouths of children and have heard frequent complaints of patients who have been thus inconsiderately treated.

The removal of irritants from the teeth, gingivae and tongue, followed by

therapeutic measures, will materially reduce the bacterial count and the inflammation, and improve the field for dental, oral or periodontal surgery. The foregoing procedure is indicated except where it is desirable and possible for the patient himself to accomplish a definite reduction of the bacterial count in the mouth and a reduction of the inflammation or an improvement in the circulation by means of the toothbrush, massage and the mastication of resistant foods.

At this time, the patient should be asked to discard whatever toothbrushes he has been using in the home care of his mouth and be given new ones with instructions in their use and any other information he may need to maintain a hygienic condition of the oral cavity. If the dentist never sees this patient again, he will have rendered him a service of permanent value by giving him a practical demonstration in mouth hygiene and the knowledge of how to care for his teeth. The personal interest of the patient in his teeth will be so stimulated that he will rarely fail to follow up the work thus begun. This preparation of the field is desirable for surgical procedures in the mouth as well as for examination.

The use of the roentgen rays to reveal conditions in and immediately surrounding the teeth is recommended, but that they may be of real value, knowledge and skill are required both in technic and in interpretation. Quite recently, a patient of mine was referred by her physician to an exodontist for a second complete dental roentgen-ray examination. The resulting films were of such quality that had there been unfavorable conditions to disclose, they probably would not have revealed more than the most serious ones. Although the exodontist gave the patient a clean slate, the physician marked for extraction two overlapping lower incisors which looked to him like one pulpless tooth with a large root canal filling. A lack of accuracy in roentgen-ray technic often results in such distortions of the teeth and alveolar process as to render the films of little value in diagnosis. Not so many years ago, the roentgen rays were used in dentistry only to reveal unerupted and pulpless teeth. While it is fortunate that almost any kind of roentgenogram discloses these, it is also unfortunate, that since these imperfect films are used for study and interpretation, many incorrect diagnoses result.

For the disclosure of obscure cavities, the rays should be focused on the crowns of the teeth; for a periapical condition, on the apical third, and for a periodontal condition, on the middle third. Since the depth of a periodontal pocket in a roentgenogram can be varied at will by changing the angle of exposure or the position of the film, one set of roentgenograms may be most discouraging while another set may present an entirely hopeful aspect. On this account, we should attempt to encourage the use of a standard technic in a roentgen-ray examination for periodontoclasia. Even the best roentgenograms tell but a partial story concerning periodontal conditions; hence, a clinical examination, preferably by a dentist experienced in the successful treatment of periodontoclasia, is also essential to a reliable diagnosis and prognosis.

Physicians, and many dentists also, refer their patients for dental roentgenograms and their interpretation to the exodontists or oral surgeons who, by the very nature of their work, are inclined to be pessimistic about the saving of teeth. They are disposed to condemn teeth affected with periodontoclasia and frequently advise the extraction of all of them as the most economical procedure

and the easiest way out of a difficulty for the patient. Many beautiful teeth are thus often needlessly sacrificed, and this fact should be called to the attention of physicians and impressed on the minds of dentists. For many years, exodontia and oral surgery have been the commonest point of contact of dentistry with medicine; hence, the more constructive phases of dentistry are unfamiliar to the majority of physicians. Many of them make their own dental roentgenograms and interpret all destruction of alveolar process unfavorably without clinical examination and with little or no knowledge of the dental case history. While it may sound empirical, it is impractical to insist on a complete set of dental roentgenograms once each year for every patient, desirable as that might be. Unfortunately, they are constantly being used for exploiting patients, and this practice should be seriously condemned by every thinking dentist.

Since it is often necessary to make an examination for periodontoclasia without the aid of the roentgen rays, the dentist should be able to recognize the least deviation from normal in color, tone and form of the periodontal tissues, as well as dental defects. It is essential that he be equipped with fine explorers of various shapes and suitable instruments for the early detection of cavities and periodontal pockets. He should make the effort to develop a keen diagnostic sense and apply common sense in diagnosis.

The use of casts is recommended as next in importance to roentgenograms. An experienced dentist can make a satisfactory diagnosis without them, but that they are invaluable aids any one who makes a practice of their use will testify. Accurate impressions and well-made casts are useful not only in examination, diagnosis and treatment, but also for recording conditions present; in fact, they are superior to all other means available for the latter purpose. They show readily the occlusion of the teeth, position and form of the gingival margins and interdental papillae on all surfaces; size, form, position and interproximal relations of the teeth; proximal occlusal relations; form of arches; masticating efficiency; and development of the process. With special markings such as dots, circles, crosses, arrows, curved and straight lines, they may be used often in place of record charts. The plans for any necessary restorations may be marked on the casts also.

CONCLUSION

I wish to repeat that the winning of a patient's confidence is of primary importance; the relief of pain or discomfort is the first obligation preliminary to complete examination procedures; noting the form, color, tone and position of the gingival margins and interdental papillae should become second nature; lacerations of the tissues in exploring the gingival crevice is to be condemned; suppurative periodontoclasia can be easily recognized by gentle pressure over the root areas, which will force from the pockets macroscopic pus; a reduction of the bacterial count in the mouth is a necessity, as well as the instruction of the patient in mouth hygiene; to record dental defects is essential, and a complete roentgenographic examination and the making of casts is always desirable but not necessarily indispensable, excepting in unusual cases. Finally, to perceive and discern the most, at the same time serving the best, with economy, efficiency and maximum simplicity, should be our highest aim in examination for periodontoclasia.

DISCUSSION

Arthur H. Merritt, New York City: The general practitioner has been frightened away

from periodontia by so many of the complicated features that have been brought into it, not with the intention of frightening him but because it is natural for some people to complicate a situation without intending to do so. I believe our examinations can be made much more simple than they are frequently represented to be. I am particularly interested in what Dr. Spalding said regarding gaining the confidence of the patient at the first visit. There is nothing in the whole practice of dentistry more important than this. Recently, a patient who lived more than a thousand miles from New York came to me for treatment, and when I had finished with him, I referred him to a dentist, saying, "I think you had better place yourself in this man's care in the future." He said, "I have been to that man and I am never going to go to him again. I never leave his office that I don't feel completely discouraged." The first thing we should do is to encourage our patients, because, as Dr. Spalding has said, they feel concerned about the health of their teeth. I do this always, instinctively not deliberately. I tell my patient, as a rule, that the condition is not so bad as they think or have been led to believe it is. I agree with Dr. Spalding that an attempt to make a diagnosis from roentgen-ray films is entirely wrong. One cannot distinguish between the treated and the untreated case. They are helpful and should be made a part of the diagnosis, but should be regarded only as a part. The question of the practical demonstration of principles of oral hygiene is also of first importance. I have discovered, after many years of practice, that, in many instances, it is impossible to teach a correct toothbrush technic by any description of it that one may give the patient. I never dismiss a patient without giving him a practical demonstration, handing him a brush and having him use it in his own mouth. Each time that he comes back, I try to show him wherein he may have failed and to help him where he has found difficulty. I believe that we all need to do this. A roentgen-ray examination is not necessary every year in all cases. We should be reasonable in this as in every other phase of practice. The use of casts is also an important part of the record of a case, although they do not need to be made in every case. We should use more models, such as those the orthodontist makes, as records. Unfortunately, they, like all other things in periodontia, involve time and added expense to the patient and cannot always be made a part of our procedure.

Clyde C. Sherwood, Toledo, Ohio: I was glad to have Dr. Spalding emphasize effective mouth hygiene. If this point alone were taken seriously, not only by men interested in periodontia but also by those who are interested in the general practice of dentistry, humanity could be served much better.

Isador Hirschfeld, New York City: This subject is of great interest to all of us, general practitioners as well as periodontists. I was glad to hear Dr. Spalding minimize the importance of routine bacteriologic, as well as urine and blood examinations, etc., in the ordinary, average case of suppurative periodontoclasia or other common conditions that we see so frequently. For these, no practical purposes could be served by such a procedure. A thorough acquaintance with a differential clinical diagnosis of these pathologic entities is generally sufficient. A gentleman who was a public health officer in the Far East contracted an infection in the mouth. The local dentist, knowing that there was a good deal of what is known as aspergillus infection, a fungus infection, in that vicinity, made a smear for, and found, the aspergillus organism. He treated the patient accordingly, but without success. He treated his case entirely on the bacteriologic findings and evidently disregarded the clinical symptoms. The patient continued to suffer, and finally, as he traveled toward Europe and further West and told the practitioners in these places that he had an "aspergillus infection," he unwittingly threw them off the scent, so to speak. They thought that he had some mysterious infection with which they were not acquainted, and so, although they did their best, they were not successful in treating it. Again, the clinical symptoms were overlooked. Finally, when the patient came to this country, he was referred to me by a dentist who had seen him first, but who, too, was misled by the "information" first given the patient. The clinical symptoms pointed very clearly to an acute Vincent's infection. That my diagnosis was correct was evidenced by the immediate response to the treatment and, within ten days, the patient was discharged as practically cured. If we would learn the normal mouth in all its details, and the

various possible abnormalities, the correct diagnosis of oral disease would be greatly simplified.

Dr. Spalding: The only point that I wish to reemphasize is that of simplification of methods of examination and treatment. If we use the simpler methods first, the difficult cases will very soon stand out, and there will be no difficulty in recognizing them, but if we apply complicated methods to every case, we will never arrive anywhere as far as taking care of a greater number of patients is concerned. It is much more encouraging to a patient if we take the attitude that Dr. Merritt suggests, encouraging him from the beginning, instead of painting a dark picture.

CLEFT PALATE AND CLEFT LIP*

By WILLIAM L. SHEARER, A.B., D.D.S., M.D., F.A.C.S., Omaha, Nebr.

CONGENITAL cleft palate with cleft lip is without doubt one of the most conspicuous deformities known to mankind.

If one is to be fairly successful in this work, his preparation must necessarily be long, and conscientious application to the principles of this type of surgery must be well worked out. The amount of surgery of this kind is limited, as compared with other types of surgery, and the long preparation is costly; for one must draw his patronage from far and wide, and, if he is not fortunate in this, he will not have enough to do to develop a technic and a sufficient understanding of the work to present to his patients anything like that which they should receive. As I grow older in the work, I am not at all surprised at the advice given by mature general surgeons that to specialize in this field, one must be willing to make many sacrifices before a practice equal to a bare living comes to him.

The economic side of this problem, to many parents, is so important that many inadequately trained surgeons in different parts of the country are led to undertake to do their best, and because of their inability and inexperience, the results are not satisfactory. For this reason, fully one-half of these patients come to the well-prepared surgeon in this field with what is classified today as a poor operation, unsatisfactory both to the local surgeon and to the parents of the children. The economic side of the problem is so important to many parents that one cannot conscientiously criticize the poorly trained surgeon who does his best, even though the work must be done over.

I am not going to take up the question of etiology because, when one is finished, the problem is still conjectural. From my own experience and observation, I might say that heredity seems to play the greatest part. This, I believe, is the conclusion of the majority of men who have had much experience.

I wish to call attention to some of the neglected cases which require rather heroic types of operations for correction of the deformity. Having undertaken the different types of operations for the different types of cases which come to one, I am of the opinion that when there is a

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cleft of the hard and soft palates, involving the anterior ridge, the Brophy operation offers the best results if the technical steps of the work are well understood and carried out. From my observation, I believe that there are none who have had so nearly universally good results as Dr. Brophy. This is said in due appreciation of my colleagues in this field. Therefore, I have followed this great master more closely than any other surgeon.

A complete cleft of the hard and soft palate involving the anterior ridge, which has not been operated on early in babyhood, presents a difficult problem. The bones have become hard and are difficult to move. Very early, Dr. Brophy devised what is known as the Brophy greenstick fracture operation to correct these late cases. The fracture was made at the point of the incision through the mucoperiosteum, and, as a result, sloughing and complication occurred in many of these cases.

Many years ago, I conceived the idea of employing the alveolectomy flap, and therefore made a modification of the Brophy greenstick fracture operation, which has been very successful in my hands. With a unilateral cleft of the hard and soft palate, involving the anterior ridge, a flap is laid back from the end of the fragment, just above the cemento-enamel junction of the teeth, to the position of the first or second molars, and carried upward from the bone as far as is desired, the same flap being employed on the other half of the cleft. Then at about the position of the cuspid and bicuspid, one should chisel through the bone, and also with the chisel make a deep line fracturing the bone longitudinally just under the infraorbital nerve and manually fracturing the jaw at a point one wishes without the loss or destruction of any of the teeth. Then, the two halves of the cleft can be placed in apposition after the edges of the bone are freshened and immobilized, while new bone is thrown out to form a good bony arch. Under the eye, with a flap laid back, one can trim all jagged edges of bone, leaving it perfectly smooth, bring back the mucoperiosteal flap over the point of fracture and suture with horsehair, the distal end of the mucoperiosteal flap being far distant from the point of fracture. Completely covering this point, one obtains, in most cases, a primary union without any sloughing, and the only complication is a little swelling.

So many cases come to me in which the lip operation was performed first, the bone being left untouched. On examination, I find secretions of the mouth passing between the mouth and nose, an unhappy thing for one as he grows older. Moreover, many cases in which only the lip has been operated on, and the cleft of the anterior ridge is left untouched, the appearance of the face is something like that of a child having adenoids. Certainly, in the majority of cases, the cosmetic results are much better, and a finely formed face is a result when the cleft of the bone is attended to first, after the Brophy method.

DISCUSSION

Albert D. Davis, San Francisco, Calif.: We who have done a great deal of plastic surgery have learned (and I think Dr. Shearer was the man who originally made this statement) that more than 75 per cent of all of the work that is done in cleft palate surgery is a failure. Suppose this occurred in any other branch of surgery. Suppose it occurred in appendectomy or tonsillectomy. The medical profession, and the dental profession, and the laymen would rise up in wrath, and there would be something done about it. But the situation is primarily due to the fact that so many of the patients cannot afford proper attention. In the country districts, they can-

not afford trips to specialists. Those in the cities are often cared for by men untrained in plastic work on the palate. The result is that the general surgeon, dentist, osteopathic surgeon and the ordinary practitioner attempt these operations. They may read up in textbooks and attempt closure from something they have seen. The man who sees one, two, three, ten, or twenty cases a year in my opinion is not qualified to handle all types of cleft palate surgery. Unfortunately, failures occur even in the best trained hands. The fundamental principle in all cleft palate work where the alveolar process or bony involvement exists is that the bone operation should be the primary step always. It is the tendency for every family to want the lip corrected first, so that the child will be presentable. But it is fundamentally wrong, from a surgical, an orthodontic and a dental standpoint. Unless the bones are united and the dental arch formed into a rounded, normal arch, the lip, the nose and the palate operations can never be done as they should be. When the bones are united, the arch is narrowed to such an extent that the soft tissue operation is much simplified. After the bones are united, the orthodontic problem is simplified, because practically all of these children, whether they are operated on or not, have to have some orthodontic treatment. The nose is brought well toward the median line, and the nose operation is simplified. The lip is drawn together by the union of the bones, and the lip operation is simplified. So, fundamentally the bone operation should be the primary operation. The lip should be closed only after a normal dental arch has been formed. Yet some of the greatest authorities advocate the closure of the lip as the primary operation, letting the bones go where they may, with the understanding that the front teeth, being irregular, will be taken out anyway, and some sort of a prosthesis made to restore the bony arch. The entire world is indebted to Dr. Shearer for his modification of the Brophy greenstick fracture operation (raising of the flap, ocular visualization of the bone and the trimming of the process.) I have found in my work that whereas we used to attend entirely to one nostril in these cases, very often we can get a much better result if, instead of ignoring what we call the normal side, we attend to both sides and bring them into proper relationship, one with the other. Just one caution regarding the Shearer modification of the Brophy greenstick fracture operation (and this does not necessarily apply to Dr. Shearer): If there is a cleft, as there so often is, in the soft tissues of the palate, we should be very careful in stripping off any of the mucous membrane on the lingual side, next to the blood supply because, very often, we will destroy enough blood supply to get a slough.

A. L. Frew, Dallas, Texas: I think Dr. Shearer selected advanced cases of cleft palate for a reason. I am satisfied that had he taken the new born and given the method of closure of the hard palate, he would have been tempted to criticize some of the men who are closing the lip over the hard palate without first closing the latter. I am afraid that if he had gone into that, he would have become very drastic because I know his sentiments in that regard. Recently, I have had occasion to see three cases where the lip was closed over the hard palate, that is, where the alveolar ridge is open, the operators claiming that the lip operation would close the hard palate. Everyone of the patients had a thin lip, drawn flat with no mucous field at all. I cannot quite understand why men take that attitude. One of the reasons they give is that when wires are placed through the alveolus, the tooth follicles are destroyed. If they performed that operation properly, they would, I believe, dismiss that fear from their minds, because when these wires are placed where they should be placed, they are high enough up that they do not destroy or derange the tooth follicles as they develop later. Dr. Brophy, I recall, made the statement several times, "It is up to you boys to carry on where I leave off." Dr. Shearer, in his work today, has brought out an advanced step in this flap operation for the fracture in these advanced cases. That was an operation that Dr. Brophy, as Dr. Shearer brought out, had failed on, but that operation today can be carried out with very few failures. I believe the Brophy operation will always stand. A man who attained the results that Dr. Brophy did for the great number of years that he practiced cannot be supplanted. I can hardly see where the newer operation that some of the men claim to use will ever supplant Brophy's.

H. S. Dunning, New York City: In the East, we are thinking more and more about leaving the bones alone. In a symposium last year before the American Association of Oral

and Plastic Surgeons, the consensus of opinion was that when we can leave the bones untouched, it is good judgment to do so. In these extensive cases that Dr. Shearer has shown this afternoon, we can do nothing but fracture the bones and bring them over, especially in a 12 year old child with a cleft as big as was shown here. The question is whether we are going to do surgical or prosthetic work. I think that these clefts can all be closed by his fine method—the greenstick fracture of the long segment of the maxillary bone, but when we see these cases late, it makes a great difference. If we see them early, when we can mold the bones with the fingers, put one wire through, and mold and hold them and bring them into a fairly good approximation, it is much better. Dr. Moorehead often employs it. When we cause as much mechanical trauma as the majority of men do in the Brophy operation, we need to think twice. I have often seen this operation handled by men who have studied the situation and who try to perform the Brophy operation. It is a difficult operation when out of the hands of a master. I agree with Frank C. Matthews, general surgeon of New York, that if we can approximate the sphincter muscle, the obicularis oris, and the fibers of that powerful muscle are working, after the time is passed when the bones are molded in the muscle, it is the best thing to do. If we see the case within three weeks or a month, we can mold the bone and put the wires in, but if we see it at six months or a year and a half, it is, I believe, too late to mold, and the traumatization is too great. I would rather bring the soft parts together, and be satisfied with that. Then, by the delayed flap operation which Gordon New describes, I close the anterior cleft, if it is not too wide. If so, I make the anterior closure by a delayed flap operation, and then make the posterior closure.

Dr. Shearer: Dr. Frew brought up the question of the destruction of the tooth follicles. I have performed more than 1,000 of the Brophy bone operations, and the results are, I think, better than when the lip operation has been done first. Dr. Frew did not mean that Dr. Brophy failed when he spoke of the Brophy greenstick fracture operation. He did not fail—not in a single case that I know anything about. But there were complications. Dr. Frew did not have time to bring that out. The complications we met in the original greenstick fracture operation arose when the incision was made at the point of fracture, and the mucoperiosteum flap was laid back, which Dr. Davis spoke of as being corrected. I have had the opportunity of seeing all over the United States these cases in which the lip operation was performed, and we find that these patients have an adenoidal expression. The complications in staphylorrhaphy are rather serious. This is the most difficult piece of plastic surgery that I know anything about, for the reason that it is building in the air, in space, as it were. This is something that is overlooked. I have performed the operation that Dr. Dunning referred to as employed by Moorehead. In many of these cases, one single wire pulls through the bone, and I met with difficulties, although I know where to put the wires in to get the greatest strength; but, remember, when these children are born, the bones are about one-half organic matter and are easily bent, and a silver wire will easily pass through them if much pressure is placed on them. The reason that Dr. New has to perform these delayed flap operations in order to close the cleft is that he has not sufficient tissue to close the cleft. These children at birth have a flat, broad face; a normal baby at birth has a round face. What happens when we close the anterior ridge with the thumbs? We can mold it as we wish if we see the patients early. I wish that I might see them ten minutes after they are born. I saw a case just a few hours after birth the other day, and the result was the best that I have ever had. When the anterior ridge of the palate is closed, the posterior ridge at the posterior border of the horizontal plates is like the suspension bridge that Brophy outlined. When pressure is brought here, the tendency is to move out at the elbow or back at the tuberosity, so there is a space which is just as much greater than it should be as the distance from the cleft. If anyone will take measurements at the time of birth, they will find that the distance from tuberosity to tuberosity is just as much greater than it should be as is the width of the cleft. We do not have an excess of tissue. In some of these cases, I feel that we have no tissue. If the amount of tissue is not sufficient, how is one to stretch the tissue for a successful staphylorrhaphy, and institute a proper mode of speech? The reason that so many men are failing in these operations is

that they do not understand the principles of the operation laid down by Brophy. Dr. Dunning was right when he said that it is technical. There is not any man living who can master that work in one year's training under a master surgeon. But that does not excuse us for not getting two to five years' training. What did Brophy do? With the palms of his hands, he moved the malar bone so that the posterior part of the cleft was reduced, and after he finished those operations where there was a cleft an inch wide in the posterior part of the palate, sometimes he brought the sides of the cleft down so that the mucoperiosteal flaps almost came together. As Dr. Davis brought out, this simplifies the operation. I have never yet seen anyone get the cosmetic and the functional results that Brophy obtained. Until I do, I shall adhere to his teachings. The operation that Dr. Dunning described is much simpler and easier, and does not require the technical training required with the Brophy operation. But let us consider the double cleft palate, with the premaxillary protrusion. What are we to do about that? Some of the finest work that I have seen was that of Dr. Blair in St. Louis. I marveled at what he was able to do in a double cleft palate with the premaxillary protrusion. But all of these children had adenoidal expressions, and did not have the appearance of bright children. The simple unilateral cleft, or double cleft with the premaxillary protrusion where the premaxillary protrusion is possibly a quarter inch is a simple thing. But what of the cases in which the premaxilla protrudes from a half to three-quarters inch? The pressure of the orbicularis oris muscle will gradually force the bones back in place, because, as I said, they are about half organic matter. Let me say that I meet with difficulties, until someone can demonstrate to me an operation which matches that of Brophy, and which will give the cosmetic and the functional results of that operation, I shall continue to employ that operation.

ROUTINE RADIODONTIC EXAMINATIONS IN ORTHODONTIA*

By CLARENCE O. SIMPSON, M.D., D.D.S., F.A.C.D., St. Louis, Mo.

ALTHOUGH a few orthodontists were among the first dentists to appreciate and employ radiodontic examinations, this auspicious introduction has not had sufficient influence on orthodontic practice. Ketcham, McCoy, Waugh and others have ably demonstrated the advantages which radiodontia offers in diagnosis, prognosis, and treatment observation, but most orthodontists are still lax in applying this knowledge. This generally admitted negligence is principally due to inertia and the lack of systematic procedure, two common obstacles of human progress which not even doctors have overcome. Inertia is that property of matter and men which causes them to remain stationary, or, if in motion, to continue in the same direction while it is the line of least resistance. The direction of least resistance is seldom the shortest distance between points. Systematic procedure is the control of mind over matter which overcomes resistance or external influence in covering the shortest distance between points.

The progress of orthodontics has been due largely to the improvement of diag-

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nostic methods and more careful attention to diagnosis. This is scientific and substantial progress because accurate diagnosis is the basis of rational treatment. The possibilities of standardization are far greater in treatment than in diagnosis, which is essentially a process of judging the significance of the symptomatic data. Without depreciating the value of other diagnostic factors, we must recognize that all obtainable information regarding the teeth of each patient is indispensable. Regardless of the evidence supplied by casts, photographs or charts, the status of the teeth remains a factor of vital importance.

Probably there is nothing new to present in the application of radiodontic examinations in orthodontia because the field has been covered by the many pleas which have been made. However, constant repetition with forceful argument apparently constitutes the only hope of leading otherwise intelligent orthodontists to realize the obvious advantages of routine radiodontic examination. The requirements of specialized practice and the service demands of the educated laity are too exacting for guessing, trial and error and dependence on the law of averages to serve as a substitute for modern diagnostic methods. Orthodontists who exhort dentists to learn to recognize incipient dentofacial deformities, but do not utilize every available means for accurate diagnosis and efficient treatment, are as inconsistent as dentists who clamor for dental service propaganda but do not render the service. Orthodontists will be in a more tenable position to broadcast the advantages of early consultation when there are fewer errors in diagnosis and failures in treatment.

The common mistake of orthodontists lies in not adopting radiodontic examination as a routine procedure before instituting treatment and during the period of treatment. When examination is made only in the exceptional case or after complications have arisen, much of the opportunity for service is lost. Since orthodontic patients have an abnormal dentition, there is a probability of their having dental anomalies. Delay in recognizing anomalies prolongs treatment unnecessarily and may impair the ultimate result. The only method by which this risk can be eliminated is to investigate thoroughly the dental condition of each patient.

Radiodontic examination must not be considered superfluous when nothing unusual is discovered, because it is valuable in exclusion. A correct diagnosis is often reached by a process of exclusion. The precaution of thorough examination is a duty to patients and a means of increasing the efficiency of orthodontists. The time, discomfort and expense entailed in radiodontic examinations are slight in comparison with the time, discomfort and expense incident to orthodontic treatment. It is a privilege of orthodontists to waste their time through negligence, but it is not their privilege to prolong the discomfort of patients and waste the time of patients and parents.

There is much to be learned regarding the effect of orthodontic treatment on bone and teeth. In some instances, the results have been disastrous. Shall we continue to guess at the cause of disasters and wait for them to occur, or shall we have periodic radiodontic examinations during treatment to observe developments? The answer to this question was vividly impressed on one orthodontist whose defense of a malpractice suit was materially weakened by the absence of radiodontic evidence while the plaintiff had ample radiodontic evidence of an unfavorable nature.

One of the reasons for infrequent and inadequate examination is the possession of radiodontic equipment by many orthodontists. The effect is similar to that on general practitioners: they do not render the necessary service and they prevent anyone else from doing it. Under the spell of high-pressure salesmanship, there is a delusion that the equipment is the only requisite for service. After discouraging experiences, enthusiasm wanes and examinations are either neglected entirely or limited in scope. Orthodontists and dentists have such extensive fields that they are unlikely to become proficient in radiodontia; yet many of them insist on practicing it.

Orthodontists are especially handicapped in rendering the service, because radiodontic examination of children is most difficult. The lack of muscle coordination prevents voluntary immobility, the oral tissues are sensitive, the mouths are small for ordinary film packets and the patients are usually deficient in cooperation. To evade these difficulties, orthodontists are inclined to make a compromise by examining the posterior teeth extra-orally and the anterior teeth by placing the film packets in the incisal plane, instead of obtaining lingual views of all the teeth. This method is deceptive in localization of the anterior teeth and lacking in definition for the posterior regions.

The minimum requirements of a radiodontic examination for orthodontic diagnosis are twelve intra-oral views. The allotment of these views are: one median and two diagonal views of the maxillary incisor region, one of each maxillary cuspid region, one of each maxillary molar region, one of the mandibular incisor region, one of each mandibular cuspid region and one of each mandibular molar region. These views are essential to reveal the number of teeth present, the mesiodistal and supero-inferior location of the unerupted teeth, caries in the approximal surfaces of the teeth, decalcification of the deciduous roots, the development of the permanent roots and the condition of the alveolar bone.

When there is occasion to determine the position of unerupted teeth, or their labiolingual or buccolingual location, the examination should be supplemented by occlusal views. If the third molar regions are to be examined, extra-oral views are required, because these regions in the mouths of children are inaccessible to film packets. Profile views are useful additions to the examinations, for orthodontists who study facial deformity and are interested in facial development. The twelve intra-oral views are the routine requirement.

Dexterity in placing the film packets, assistance in retaining them and the use of short exposures are desirable in radiodontic examinations of young subjects. The packets should be placed slowly and gently, while the necessity for immobility and enduring some discomfort is being explained. Hypersensitiveness or nausea may be relieved by a menthol cough lozenge. After each packet is suitably placed, the exposure should be made quickly, to reduce the risk of movement and the period of discomfort. The milliamperage should be increased to the capacity of the tube, and double-coated films may be used to reduce the length of the exposures. These precautions will facilitate the examination so that it need not be an intolerable task to either the patient or the operator, and radiodontia may fulfil its rôle as a routine accessory.

MUSCLE FUNCTIONING AND ITS RELATION TO ORTHODONTIC TREATMENT AND RETENTION*

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THE importance of the functional relation or correlated action of the different organs of the body is not generally recognized to its full degree by any of the different branches of the healing art.

It is as absurd to think that surrounding or associated organs are not affected by malformed arches as it would be to assume that tuberculosis does not affect the other parts of the body or that circulatory disorders are confined to the heart.

There seems to be no 100 per cent satisfactory method of diagnosing cases. For instance, the diagnostician or general practitioner has such a broad field with which to deal that he is prone to overlook details, while the specialist deals in details and overlooks general conditions. The statement that "the specialist knows more and more about less and less" is not all fiction. In our specialty, we have, I believe, made rapid strides in the past decade.

We recognize the effect of prenatal influence, biologic conditions, the endocrines, environment and diet, and to a degree physiologic effects, on osseous development, the last being most neglected. We can say with no fear of contradiction that specialists now take cognizance of biologic conditions in the movement of teeth, and are recognizing that stimulation is in keeping with growth, and that irritation is in counteraction to the same. According to Albert J. Key, "For the production and maintenance of a normal bone, it is necessary to have (1) a normal bone anlage; (2) normal nutrition, environment, and function during the growing period, and (3) normal nutrition, function and environment during adult life."

Therefore, we have passed from the former rigid appliances, whereby all teeth are banded together (a process which is contrary to all biologic principles, since teeth are individual organs, and designed to function as such) and have approached an era of gently assisting Nature in producing a normal bone metabolism.

And the most skeptical must acknowledge that muscle functioning is a decidedly stimulating process, and that bone grows in conjunction with muscle functioning, and the reverse happens in conditions of muscle and bone which bring about "disuse" atrophy.

For some reason, the functioning of the muscles of the face and neck is too commonly disregarded by most of our branches. We have too many instances of moving teeth, or we might say rapidly shoving them, in an arbitrary direction, and if under any circumstances they remain in this position, we have a case

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that has been roughly referred to as "all teeth." Fortunately, most of such conditions of the teeth recur; and while the teeth are still out of alinement, the face, though abnormal, will revert to a greater symmetry.

This condition is not necessary, if proper attention is paid to normal functioning of the muscles.

I shall attempt to point out briefly some of the ways in which a correlated deficiency of associated organs may occur. We doubtless have the vicious circle with which to deal in many instances, and it seems that most of the deficiencies of the dental arches, nose and throat have never been explained; that is, which is the causative factor and which is the effect. It is unfortunate that neither the rhinologist nor the orthodontist has many occasions to observe them until the damage is done. It is hoped that such work as Samuel J. Lewis of Detroit is doing will give us some authentic data soon.

We are safe in assuming that no bodily derangement has a definite local origin, that it is not likely that a deformed arch is to be found in a person with surrounding organs normal, any more than we would expect to find arthritis, endocarditis, tonsillitis or disease of any other organ without its effect on other parts of the body.

W. McKim Marriott states, "In the study of the bone, it has been emphasized that connective tissues have been specialized to meet mechanical conditions, and that both ontogenetically and phylogenetically they are formed in response to mechanical stimuli."

To trace the origin of malocclusion, we must begin at conception or earlier. If there are two healthy parents, we may eliminate the inherent possibility of the condition occurring. Then comes the acidosis and the nausea of the expectant mother, which produces starvation, and while her tissue is sacrificed in favor of the child, there is a limit to her supply and the fetus must suffer; and if the expectant mother carries the fetus to term at a sacrifice of her tissues even to a degree of osteomalacia, it is quite evident that this will cause the maternal milk to be faulty. Sajous says,

> As stated by Telford Smith: "The thyroid gland of the mother increases during pregnancy and remains enlarged during lactation, showing" adds this author, "that it is connected with fetal development." The adrenals are also known to be enlarged and overactive. Neu, moreover, found that the proportion of adrenalin in the blood corresponded quantitatively with the activity of the gestative process, including the period of pregnancy. As to the pituitary, it was found to be overactive during pregnancy by Comte Launois and Mulon and others. Swale Vincent states, in fact, that it may enlarge to two or three times its normal size. That the thymus is concerned with the development of the offspring both during uterine life and after birth needs hardly to be emphasized. We now know that its influence bears mainly upon the osseous and cerebrospinal systems. . . .
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> The continuation of prophylactic treatment through the maternal milk after birth will do more than approximately restore the developmental balances, physical and psychic, of the child; it will serve to protect it against disease. Indeed, the milk of a normal woman does more than feed her suckling; it is now known to protect the infant against infection by means of ferments which correspond in their physicochemical properties with those of the ductless glands. . . . Cows' milk contains all the defensive ferments referred to, but, unless it can be administered absolutely fresh, its protective properties disappear, the milk then becoming an excellent culture medium for pathogenic organisms.

As you see, this will affect the ductless glands, producing a compensatory hypertrophy of the tonsils and the mucosa of the nose and throat, which, of necessity, will cause mouth breathing; or the primary condition may be the reverse.

Nevertheless, it is a combination of conditions brought about by faulty relations, and the real beginning must remain more or less obscure, until some observer may find it.

The foregoing is given in an attempt to emphasize that muscular deficiency did not just happen, and that it may have a definite metabolic origin, and the physiologic condition may be secondary; that a muscular inertia is caused by a lack of lime salts available to the muscle as well as to the bone.

So since we have a more or less rachitic condition with which to deal, we must see that the patient is properly nourished before we can expect satisfactory cooperation. If we have given all the foregoing contributing functions due consideration, we can focus our attention on muscles, their origin, functions, etc.

It is to that portion of the cranium which shows the greater amount of growth from birth that the voluntary muscles are attached, and I shall attempt to show that it is their function that brings about the development of the arches.

The two most important regions for development of the skull are the sinuses and anterior mandible or chin, and it is needless to say that they develop through functioning, the ethnoidal sinus being found only in the anthropoid ape and man. The functional demands arising from forward growth of the skull have made room for another sinus.

Skillern in "Rationale of the Physiological Development of the Accessory Sinuses," states:

> Many theories have from time to time been advanced to explain this process. Among others, the following appear to be the more feasible: 1. Reabsorption of the bone due to variations in air pressure, particularly that of expiration.
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> Coffin appears to have been the first one to advance this theory when he stated that the development of the sinuses may be due to expansion under pneumatic pressure causing resorption of the cancellous tissue, as this development manifests itself at the age at which children begin blowing the nose. Frers, apparently independent of Coffin, comes to the same conclusion, basing his assertion on the following reasons:
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> 1. The principal growth of the sinuses occurs after respiration sets in.
>
> 2. According to the law of nature, organs which cease to functionate, atrophy.
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> 3. The sinuses show similarity to the other cavities which are influenced by air pressure (alveoli of lungs).
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> 4. The constant presence of changing pressure in the sinuses. (Inspiration negative, expiration positive.)
>
> 5. The direction of the inspiratory and expiratory streams in relation to the anatomical formation of the nose.
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> Both Coffin and Frers refer to the fact that the sinuses are poorly developed in children with adenoids; they consider this due to the lack of normal air pressure in the nose during expiration.

Likewise, the chin has gone through the same change, and the development of the chin is due to function of the neck muscles, including the tongue, muscles of speech, and hyoids. In other words, man is the only speaking animal, and the only one with a chin.

These statements may be challenged by some and justly so, for there are many variations in nasal forms. The foregoing is based on investigations made on a series of skulls at the Western Reserve Medical School. Dr. Pitkin made an analytic study of a certain number of skulls with deflected septums, and a number that were normal. The following quotation is an extract from his summary, which was quoted in previous article.

> Upon the average, a nose which lies more under the cranium than in front of it shows a greater tendency to disharmony of nasal form, one of the indications of which is a deflected septum. . . .

The external nose—that is, the part projecting upon the face—has a variability largely independent of cranial factors. The internal nose, that buried within the face, on the contrary, is greatly influenced by cranial form. There is some evidence that unnatural cramping occurs in certain noses in which deflected septum is a feature. And it is plain that the focus of disharmony is to be found in the area near the incisive foramen.

This led me to assume that those of the series with deflected septums would all show malocclusion. Accordingly, I secured the identification of the skulls from Dr. Pitkin, and the privilege of the Western Reserve Medical School to check these skulls.

In place of finding that all those with deflected septums had marked malocclusion, there were only slightly over 50 per cent with marked malocclusion, while 8 per cent of those with normal septums showed malocclusion. This is somewhat disappointing, as I had expected a greater number. The types of persons whose bodies find their way to the dissecting room are not exactly fair examples of the population with which we are dealing as they are more subject to injuries in later life, as both Pitkin's and my examination showed.

In the group with normal septums, there were 8 per cent showing malocclusion. There were many interesting compensatory changes in both groups. The worst deflections and the most markedly undeveloped sinuses and maxilla were found in the so-called mesioclusion type, there being no chance for anterior compensatory growth.

The group showing dilator nares, posterior and anterior, I mention first, as they may be rightly referred to as the key to the whole picture; for without normal breathing, all organs of the face are impaired.

This condition results from distending the alae of the nose as a race horse does when under strain. The muscles involved are found highly developed in the tribal Indian, in athletes, etc. The "high cheek bone" of the Indian and the cromagnon man are evidence of sinuses well-developed from forced breathing of fresh air.

The dilator nares muscles are poorly developed in mouth breathers and great difficulty will be encountered in coaching them on their use, the success or failure of the treatment depending largely on the condition of the breathing apparatus.

The functioning of the levator labii superioris alaeque nasi is accomplished by raising the upper lip and alae of the nose. This muscle is usually deficient in all cases of mouth breathing or immobile or expressionless faces. The levator anguli oris, internal and external, functions by lifting the anguli of the mouth and squinting the lateral portion of the eye. The zygomaticus major and minor function between the former and the risorius and are caused to function by a broad smile. This muscle is decidedly in need of development, in most cases. The orbicularis oris is as important as the dilator nares, but as most of the muscles referred to have their origin in its fibers, this muscle will doubtless receive sufficient exercise for development. There are some mechanical devices designed to induce its functioning (Ferris rubber dumbells, etc.). If they afford greater success in their or your hands, well and good; I feel that if the muscle does its own lifting, it will much sooner develop a natural functioning and there will be much less likelihood of its returning to a state of inertia. If it seems advisable to produce a sort of a general toning of the muscles, a rotary motion of the orbicularis oris will stimulate it as well as attached fibers.

The next and by no means the least important motion is blowing out under the upper lip. There is a decided need for development in the region near the base of the nose. My observation has been that in cases of a short upper lip, the deficiency is not so much in the orbicularis oris as in the fibers attached in the nasal region, and that is why we go above the orbicularis oris to gain tissue, somewhat as an oral surgeon does in case of a cleft palate, only we do not sever the tissue but produce a normal development by the pulling of the fibers.

The muscles below the mouth, like those above, will function more or less in unison and will, more or less, promote function of the lower orbicularis.

The first, the triangularis, functions by drawing down the corner of the mouth.

The next, the mentalis, functions by flattening the tissue in the mental eminence region.

The next is that of the superior hyoid region. This is extremely important, and undoubtedly the chief factor in developing a chin. This will include, of course, the geniohyoid and mylohyoid and genioglossus. This can best be made to function by depressing the posterior portion of the tongue. The inferior hyoid is best developed by drawing all the muscles taut. There may be some ideas prevalent that posterior malocclusion is corrected by moving the mandible forward, but such an idea is erroneous, for I am sure we have such cases in the floating mandible.

This type is extremely accommodating when the clasps are placed. They will invariably place the mandible in an anterior position, thus preventing the stimulation anticipated from the clasps. Also, it is difficult to exercise the inferior muscle to any extent with the mandible thrown forward.

There is another important group that needs developing in some cases, the triangles and the posterior neck muscles. These can best be caused to function by one of the wrestlers' exercises, drawing the knees up, placing the head on a pillow and, with head thrown back, raising the body and turning the head from side to side.

DISCUSSION

Abram Hoffman, Chicago, Ill.: Did you draw the mandible backward at all in the case mentioned?

Dr. Robison: I tried not to.

Dr. Hoffman: What was your treatment as far as the muscular exercises were concerned?

Dr. Robison: It was the forced breathing particularly of all upper muscles.

Dr. Hoffman: Blowing air?

Dr. Robison: Blowing air under the upper lip, which is most important in that type of case.

Hugh Tanzy, Kansas City, Mo.: Is there a possibility with those who are not familiar with this technic of developing too much in the wrong direction?

Dr. Robison: There is a possibility, but I never have had that trouble. When we get to about the proper point, Nature probably enters in and determines the outcome. However, that is a note of warning.

Dr. Tanzy: You spoke of children wanting to use muscles that were already developed, and we have all noticed that if we exert pressure in the way that Nature intended, we improve and hasten development.

Dr. Robison: Dr. Bell, of Dallas, Texas, has taken photographs and is making a book which you can secure if you desire it. He has worked these exercises out to where they are quite accurate, and the photographs will afford a good idea of them, although motion pictures would be much better, of course.

Harry Kelsey, Baltimore, Md.: If there is an abnormality, there is, of course, a reason for it, and anything which will combat that abnormality is a rational treatment. I agree with Dr. Robison that the danger

of overdoing is less than that of underdoing in these cases, but I think it a commendable thing for a man to take the initiative along lines of this kind, especially when it is so extremely difficult. It is a great deal easier to have appliances made, or to make them yourself, and to go to work on that patient, than it is to struggle along with the patient and have the patient himself overcome the condition. Patients are always glad to come to you to be cured, but very rarely are they willing to help themselves. It is cooperation, in a broad sense.

Martin Dewey, New York City: I believe more failures result from improper muscular action than from any other one thing.

Dr. Robison: I may have left the impression that this is considered a complete treatment. It is not. It merely assists. Years ago, a mother came in with a little girl, and she said, "Doctor, that looks worse than when you started." Naturally, this started me thinking. We should keep the surrounding tissues moving along with the teeth. Why not try to keep the face and the surrounding organs up with the teeth?

HISTOLOGIC STUDIES OF LIVING TISSUE REACTIONS ASSOCIATED WITH PULPLESS TEETH THAT MAY BE TAKEN AS EVIDENCE OF A SATISFACTORY OR PHYSIOLOGIC HEALING*

By EDWARD H. HATTON, B.L., M.D., Chicago, Ill.

THE evidence with respect to apical regeneration after root canal treatment has been built up over a considerable space of time by a rather large group of workers both in this country and abroad. Three methods of approach have been used, bacteriologic, roentgenographic and histologic. The most impressive mass of material has been supplied by the histologic group, although the bacteriologic and roentgenographic methods are of more use in clinical practice.

One of the pioneers to study the end-results of root canal work histologically is Grove. In his work, and this is relatively true of the work of most of his successors, more attention was paid to the tooth apex than to the investing tissues, that is, both bone and peridental membrane. Grove called attention to two changes at the tooth apex following root canal treatment: one, a tendency for the apical peridental membrane to invaginate itself into such parts of the apical pulp canal as were not occupied by the filling material; the other, a tendency of the soft tissues to deposit new layers of a cementum-like substance on the tooth apex both inside and outside the canal, but particularly inside the canal, even to the obliteration of the canal lumen. This very desirable result was brought about, according to his idea, by bringing the apical termination of the filling material to the junction of the cementum and dentin, or, as he put it, to the narrowest part of the canal at this level.

Only a little later, Clyde Davis, in a rather voluminous series of articles in both American and foreign journals, described similar changes occurring with-

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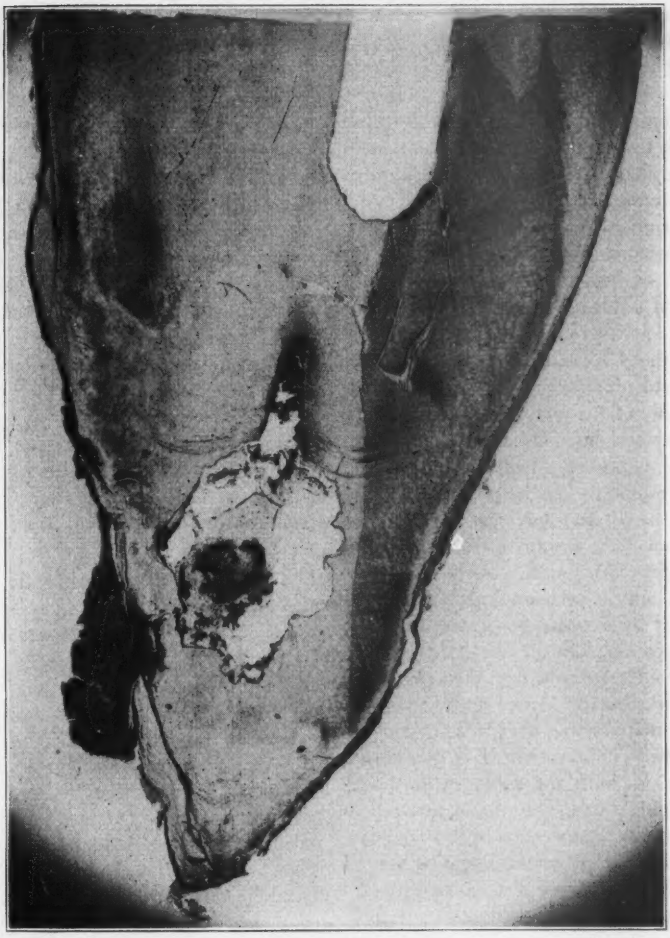

Fig. 1.—Longitudinal section of root of tooth the apical canal of which was extensively infected after root canal treatment. The diameter of the canal has been enlarged by resorption and the infectious process extended to the outside of the tooth through an accessory, lateral canal.

in the canals, as far as they concern calcification. His articles give one the impression that he believed this favorable result to be brought about by the use of a modified pulp amputation method. After this type of treatment, according to him, in suitable cases, the pulp canal tissues in the apical portions of the roots which were not removed and which were vital underwent a transformation and produced an osteoid tissue which was deposited on the walls to a degree that

ended in the obliteration of the canals so treated.

The two ideas of these workers that seem to have stood the test of time are, first, that, after treatment, if the canals are not totally filled, an invagination of the peridental tissues into the unfilled canal lumina takes place or that vital pulp remnants are transformed so that, in the second place, in all cases that are said to be healed, a deposit of calcified material is formed both within and outside the apical canals.

At the University of Zurich, where Hess had previously produced the splendid study of the anatomy of pulp canals, Mueller and his associates made a number of experiments on rabbits, amputating pulps, mummifying the pulp stumps and filling the coronal portions. He observed that such pulp stumps were resorbed by being penetrated with vessels that originated from the peridental membrane, and replaced by a tissue generated from the same location. On the walls of the canal, an osteoid tissue was deposited similar to that described by Grove and Davis. In his animals, none of the canals were completely obliterated. His work was checked by both the roentgen rays and bacteriologic tests. He found that where this type of regeneration was found histologically, the bacteriologic examinations were negative; that is, these tissues were sterile, and the roentgen-ray examinations were also negative. These preliminary experiments have been followed by him and other workers in the same group by studies on both animal and human material which tend to verify the constancy of these changes in favorable cases.

Even before these facts had been substantiated, I came to the opinion that after treatment and filling of root canals, a process was initiated which was essentially similar to the changes that follow bone fracture and which may be divided into three stages, at least for the purpose of description and analysis, namely, a destructive stage, a constructive stage and a resting stage.

This first period is characterized by removal, resorption and dissolution of all the tissue damaged to the extent that it cannot function, whether it be in the pulp canal or in the apical space. This process is carried on either by the tissues in the apical space or even by those within the canal that have not been seriously damaged. It is associated with the prolifieration of new blood vessels and the entrance of not only these into the region, but also of leukocytes and other wandering cells, a process that has been thoroughly expounded by Aschoff and Maximow, as well as others.

The second stage is characterized by the replacement of lost hard tissues of the tooth by osteoid cementum and bone by new bone. This process is extended so that space formerly occupied by soft tissues is calcified, and, in some instances, this extends to nearly complete obliteration of the unfilled portions of the pulp canals. It is true that both stages frequently may be found in the same specimen, so that the influences that bring about the transition from the first to the second stage must be, in part, highly local. The limit to which this calcifying process extends is probably determined in part by the degree to which the functional demand for a soft tissue is reduced, and partly by conditions that are not understood. This change involves the small accessory, as well as the large main, canals. Indeed, it is likely to be more marked in the smaller canals than in the larger. It also extends out into the apical space, so that tooth apex, peridental

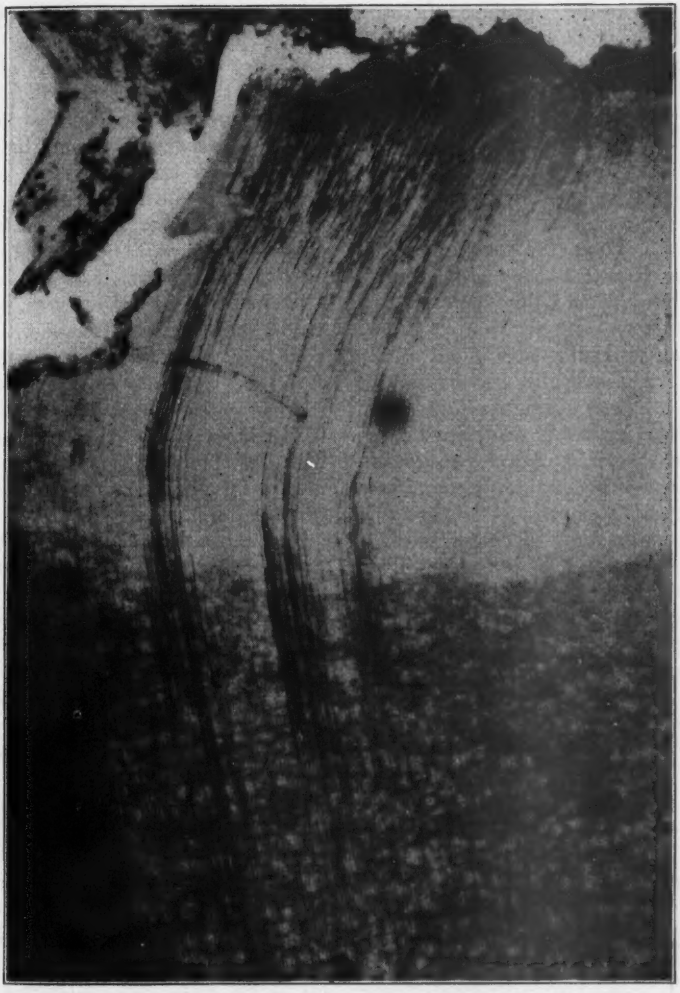

Fig. 2.—Higher magnification of dentin of tooth illustrated in Figure 1, on coronal border of pulp canal enlarged by resorption. Many of the dentinal tubules are dark and widened because of the growth of bacteria in the tubular spaces.

tissues and bone share in this type of regeneration.

Eventually, this calcifying process comes to a standstill; and this marks the beginning of what may be called the resting stage. In this condition, the apical region persists for years without evidence of any change, inflammatory or otherwise,

except for a tendency of these soft tissues to undergo a fibrous atrophy.

Skillen examined a large number of human teeth that had been treated and filled and found the changes already described. He also found very evident correspondence between the information supplied by the roentgen ray and by histologic examination. He lays emphasis on the complication of the histologic picture and the rather high degree of fibrous degeneration in the pulp stumps that have persisted for a comparatively long time.

Blayney's studies have added a considerable mass of evidence to the end that this type of change is to be relied on, and he further emphasizes the point that an important factor in producing such favorable reactions is a surgically clean technic. Coolidge has demonstrated that, as a rule, the filling material is bordered by a fibrous layer which is not calcified and that calcification never occupies the full diameter of the canal.

Gottlieb and his co-workers have proposed a biologic test for pulp canal treatments by embedding the apices of treated teeth in animal tissues, particularly in the thighs of white rats. They have shown that the apices of healthy teeth do not provoke reactions; that the apices of infected teeth always do, and that, at least in teeth that have been filled with a silver preparation, and successfully so, there is no reaction. From this method of testing apices, they also conclude that the smaller canals, and particularly the accessory canals, are more difficult to handle than the larger, more accessible main canals. This conclusion is based on the fact that they found more evidences of reaction in the tissues of the rats at places opposite the openings of these small canals in the tooth apices.

Abundant bacteriologic evidence has been accumulated by Rickert and his associates in addition to that already mentioned to justify the belief of the histologists that the apical regions of these so-called successfully treated teeth are devoid of infection and to offset the very considerable amount of conflicting testimony of other bacteriologists.

One more item deserves discussion before the validity of this evidence is critically weighed. The dentinal tubules have been frequently credited with being a residual source of infection in pulpless teeth. The bacterial infection of the dentinal tubules is perhaps the only, at least as far as descriptions are concerned, infectious lesion of the dentinal tubule that is recognized and that has been described. Such infections of dentinal tubules in pulpless teeth are extremely rare. As far as I can remember, I have seen only one. Even in this case, the infection wa propagated from the pulp canal and not from the tubule into the canal space. (Figs. 1-3). This point has been discussed by Marshall and his argument is especially to be commended. He disposes of not only this point, but also the question of diffusion through the dentinal tubules outward through the cementum into the peridental membrane. When one considers that the tubule ends are covered completely either by the filling material or by osteoid cementum in the so-called healed cases, one is driven to the conclusion that this theory of reinfection of filled pulps has little or no standing.

While this summary does not cover all of the work that has been done to supply evidence of a favorable biologic reaction following the filling of pulp canals, it is sufficient for the purposes of this paper as it includes all of the points that should be considered.

Are these processes that have been described to be taken as evidences of a favorable physiologic repair and regenera-

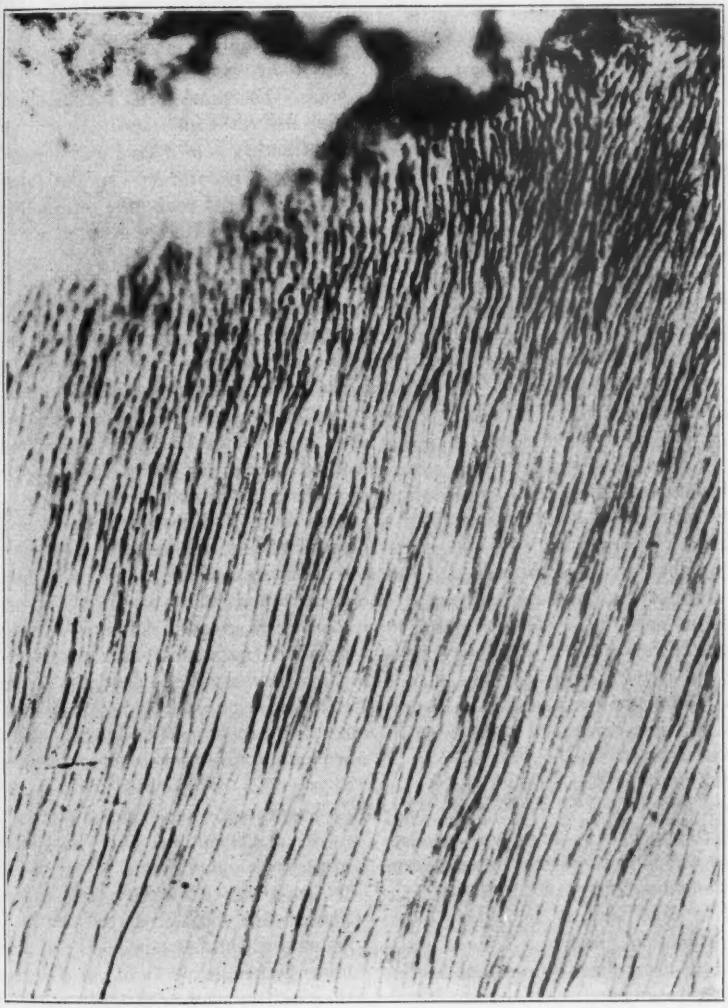

Fig. 3.—Higher magnification of part of field shown in Figure 2. Bacterial masses cling to the wall of the canal at this level and fill most of the tubules in the dentin.

tion? This question may be difficult to answer except by analogy and comparison. At least, that is the feeling that I wish to express at this time. For such a comparison, a fractured bone, a bone sequestrum and a replanted tooth have been selected.

The reaction to a replanted tooth is distinctly different from the reactions previously presented in this paper as char-

acteristically present about the apices of treated teeth. The reaction to the replanted tooth corresponds in most respects to the first stage of the treated tooth, but the important item is that it never passes beyond the stage of destruction into a reparative or constructive stage. The destruction of the tooth by resorption is slowly or rapidly progressive and only ceases when the tooth root is destroyed to such an extent that the tooth is shed. It should be said that in the case of the treated or pulpless tooth, even in failures, the destructive process is never progressive to this outcome.

In many respects, the behavior of the tissues to a bone sequestrum is like that found about the apex of a tooth with a filled root canal. There is a definite effort at resorption of the dead bone which is more or less successful. In a considerable number of cases, there is also new bone production, and the new bone is placed in such a location as either to cover over the surface of the dead bone or surround it with new bone, the involucrum. So far, the two processes are nearly identical. But the majority of bone sequestra connect sooner or later by a channel or sinus, sometimes by numerous sinuses, with some surface of the body through which is discharged an exudate and occasionally fragments of dead bone. The sinus tends to persist until the fragment of dead bone is dissipated in one way or another. As far as I know, pulpless teeth never have sinuses unless they are grossly infected.

In the healing of the broken bone, there are found the same stages that are found in the apical region of treated and filled teeth: (1) a stage of destruction or dissolution of the products of the injury, such as blood, damaged soft tissues and a certain amount of bone; (2) a stage of repair, characterized by the formation, first, of a fibrous callus, and later by the production of new bone or the bony callus, and (3) the resting stage. The same series of changes have been described for fractured teeth, where the fracture is of a kind and degree that permits a restoration. In the repair of these fractured roots, the process is similar in all essential respects to what has been described as applying to pulpless teeth. Indeed, in some of these fragments, the conditions are exactly similar, in that pieces of dentin covered on one side with cementum are pulled away from the main fragment of the tooth so that the fibrils in the dentinal tubule are torn away from their cellular connections in the original pulp.

Since the reactions at the apex of a pulpless tooth differ markedly from those found about a replanted tooth and a bone sequestrum and are essentially similar to those found in the healing of a broken bone, it is assumed that they are physiologic in character. That conclusion is based on the premise that the healing of a broken bone is physiologic and that the reactions to a replanted tooth and to a sequestrum are pathologic and hence not physiologic.

There are four statements that are made about pulpless teeth that may be mentioned and disposed of briefly. It is said that they are more brittle and more likely to be discolored, frequently associated with unpleasant odors and have a much higher incidence of apical infection than healthy teeth with intact pulps. The first three, I believe are irrelevant and immaterial. Senile bone is much more brittle than young bone. Discoloration may easily arise from foreign pigments introduced during treatment or from broken up blood. Unpleasant odors are so often associated with leaky fillings, overhanging crowns and infections at the

neck, all conditions common in pulpless teeth, that the cause for this condition of odor is to be found in these rather than in the root canal or at the apex. At least, it may be said that the connection for the last condition to the pulpless tooth is very questionable. In a lighter vein, disagreeable odors are not accepted as a reason for eliminating body structures.

There is no doubt that infections at the apex are more common about pulpless teeth. Black's widely quoted paper clearly indicates that they are less common about pulpless teeth that seem to be well-filled as seen in the roentgen-ray film. Had Black been able to differentiate teeth that are not only well filled longitudinally but also transversely, his figures, without doubt, would have been much more favorable to the filled tooth. It is, therefore, possible to discount this statement very materially, although I am sure that even the most optimistic advocate of root canal fillings will admit that the incidence of infections about the apices of pulpless teeth must always be higher than about the apices of teeth with pulps. This fact cannot be accepted as evidence that these reconstructive reactions that have been described are pathologic.

It may be said that there is abundant evidence from many different sources that a process occurs about the apices of many pulpless teeth that is essentially similar to the repair of a broken bone, and that this process is physiologic in character.

DISCUSSION

John Albert Marshall, San Francisco, Calif.: Although all of us wish to attain that degree of perfection in our operative procedures which is characterized by the mystical figure of 100 per cent, we have not yet reached that position. Most of us would hesitate to acknowledge that every root canal operation is a perfect success—the roentgen rays are too searching and too truthful. Suppose 25 per cent are successful, and that 75 per cent of filled canals are only partly filled: what justification is there for the entire procedure? It is this: Intelligent operations faithfully performed will accomplish the elimination of the *cause* of the infection.

There is also this to remember: The sense of smell is not a sufficient judge of sterility of a pulp canal. It can be relied on to detect putrescence, but the fact that a canal is odorless does not mean that it is sterile. A bacteriologic test must be made. In preliminary operations, the pulp chamber excavators, designed by Edouard Hall, of Kansas City, are invaluable. In treating the opened canal, and in subsequent filling, the compound worked out by Rickert, of Ann Arbor, is extremely useful. The essential points of root canal procedure are: (1) *sterility* of the canal, proved bacteriologically; (2) *dryness,* not dryness assured merely by the use of paper points, but dryness obtained by applying alcohol and acetone, and after removing the excess, vaporizing the remainder by using an air dryer, designed originally by J. Foster Flogg; (3) sealing of the canal by an impervious liquid preparation, such as the one Rickert worked out or the chlororosin thymol solution similar to that used by Callahan many years ago. May I take exception to one point made by Dr. Hatton? It was my impression that he spoke of accessory canals as synonymous with small canals. Is that right?

Dr. Hatton: I used the word "and."

Dr. Marshall: Of course, the small canals are the worst ones to fill and the accessory canals we frequently can only pray for. This matter of transverse filling, as well as longitudinal filling, demands a degree of operative skill that it takes a good many years to develop. We have to rely, then, on solutions which have different properties to take care of the accessory canals. In the case of the accessory foramen, the extra foramina scattered about, such substances as I have mentioned will help considerably. Now, there was another point I should like to speak about, "the absorbing tooth apex." Perhaps, again, I misunderstood Dr. Hatton, but I was under the impression that the physiologic resorption of a tooth apex continued until the tooth is exfoliated. Was that the idea you wished to convey?

Dr. Hatton: That is, in the replanted tooth.

Dr. Marshall: With the treated tooth, that is certainly not the case, for we have material

already prepared which shows definitely that apposition, formation of "osteoid cementum," has occurred. I like that term because it expresses exactly what one should say. The new tissue of the tooth is neither bone nor cementum; it is the new appositive tissue built along the area which was previously cut away. There is one other point that I think should be mentioned, and that is the analogy of the arm that is in the cast. Of course, pathologists do recognize the condition of inactive atrophy, and unless the peridental membrane has something to do, degeneration of one sort or another will surely follow.

Dr. Hatton (closing): Lest you gather the impression that I was trying to ruin the method that you men have of roughly deciding whether pulp canals are infected or not affected as you treat them by odor, I will say that I was not. This paper has nothing to do with treatment except as far as you can apply these facts. Is there such a thing? You may use odor and bacteriologic tests and the roentgen rays in clinical procedures. I have not said a word against it. I have never pulled a pulpless tooth that had not a vile odor. The point I am making is that an odor is not an argument that a pulpless tooth is physiologic. Odors have value in treatment.

DIAGNOSIS AND ESTIMATION—TWIN FUNDAMENTALS OF PROFESSIONAL AND PROFITABLE OFFICE PRACTICE*

By W. N. MILLER, D.D.S., Flint, Mich.

THE adjustment of a dentist's professional and business behavior while conducting the details of his chosen vocation is an old subject.

Economics is just an application of the head to the matter in hand. In our case, it is dentistry. Surely, the magnet that attracts us here from all parts of the country is that here we receive education and inspiration so that we may practice the best type of dental service which our preparation will permit and that we may develop a successful practice.

It is just nineteen years this month since I accepted my first professional fee. Whatever of life's necessities and comforts I have enjoyed or have provided for those dependent on me has been financed by my professional fees. Instead of being apologetic when I mention remuneration for professional service, I am proud to present what I consider a reasonable approach to the subject.

This subject has been discussed by conservatives, rationalists and extremists. I have combed the literature of many years in preparation for this paper, and still I will be found to give few direct references to the many men whose influence has promoted these remarks. When I read an article containing fifty thoughts distinctive one from another and find ten of them numbered in reference to a bibliography, I assume that the author considers the other forty as children of his own thought or fancy. Of course, I really do not think the author intends that interpretation, but I am

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going to avoid the issue by acknowledging specifically only direct quotations. Of the rest of the paper, I can say only that if you find just one idea that is new in dental literature, I shall be rewarded plentifully by the benefit it may be without your being careful to remember where you obtained it.

This paper (and I believe all others) is but the dissemination of a myriad of impulses received from as many sources, accumulated through the years of the essayist's life, and compiled in the light of his vocational experiences. Therefore, my only claim to originality must be in the possibility that I may have had some

INTRODUCTORY CHART OF INFORMATION AFFECTING DIAGNOSIS AND TREATMENT

Name Age Family history
Address
Referred by
Charge to
Estimate desired
Arrangement of payment
Remarks regarding finances or business references

On file Date filed Taken out Destroyed
X-rays
Diagnosis
Drawings
Estimate
Findings on presentation Prognosis
Mouth General A B C D Tongue
Mucous membrane Saliva
Gum margins Pyorrhea 1-2-3
Vincents
Unusual Presentations
Location of pericemental pockets

Dental Irregularity Repairs proposed
Traumatic occlusion
Evidences of wear
General attrition Sharp edges
Loose teeth
Repairs present in mouth

Cause of Gingivitis—Calculus—Rough Margins
Family Physician
Last examination
Desires—Gen. exam.; Estimate; Partial repair
Last dental examination

X-ray findings

Fig. 1.

new experience, made some new mistake, or reacted to old impulses in some new manner.

I shall try to visualize the advantages

ESTIMATE FORM

Name ..... Date .....

All estimates are approximate but effort is made to approach the exact cost as nearly as possible.

Preliminary gum treatment		
Prophylaxis		
Full mouth x-rays		
Study models		
Emergency repairs to present		

Fig. 2.

to be obtained by conducting the professional approach to your practice as a logical analysis of a thorough diagnosis. And I shall try further to visualize the advantages to be obtained by conducting a business-like approach to your practice as a logical interpretation of your patient's desire to trade hard cash for the service you are capable of rendering. Is that plain?

What constitutes a thorough diagnosis? Is the making of a thorough diagnosis a simple thing? The questions to be asked a patient cannot be left to chance and the answers given by a patient cannot be entrusted to the memory. It is absolutely essential to have a form which we follow in questioning and recording clinical evidence. The style of form may be simple or complex, this depending on the thoroughness with which we have learned to conduct our diagnosis. I had culled the things that seemed nonessential from several forms before starting one of my own. I used forms typed five or ten at a time for nearly a year and kept making changes as they appeared useful until I finally decided that I had one which was satisfactory and had a number of them printed. You may do the same to your advantage, or you may take the form I use and follow it assiduously until the need of the various information becomes apparent. In brief, a diagnosis form must have seven features: (1) the identity of the patient with whatever information can be had; (2) a record of the various aids employed in arriving at conclusions and explaining the conclusions to the patient; (3) a record of conditions in the oral cavity at present; (4) a record of conditions hidden on ocular examination, but revealed by the roentgen rays or transillumination or other agent; (5) a picture of the patient's tendencies as revealed by a history of his parentage; (6) a record of the prognosis, which is the hope of comfort and safety that you extend to your

patient; (7) a record of the repairs proposed to bring about these results.

This is purely professional information and indispensable. I make this record and tell my story to every patient so that he or she may know what care would, in my opinion, serve them best. Even if I think that their financial situation will not permit extensive repair at present, I outline their needs just as carefully. One can never tell what value a person places on a healthy mouth and body. We have no right to judge that a patient is entitled to only half the information that we have concerning them because we think them poor. The wealthy man often loses his health by saving his wealth, and frequently the poor man has maintained his health by spending his wealth.

Let us get all the information that we can to help us plan the proper treatment for each patient, giving each patient all the benefit of our knowledge and experience as applied to his or her case. We should let the patient be the judge as to his ability to finance the proposed service. What right have we to advise him to have his mouth only half cared for? Let us advise the patient regarding the proper care as we see it; then if half way measures are finally decided on, they will have come from the patient's suggestion, not from our advice.

If a patient of middle age, at the end of our recital of his needs, says at once, "Well, Doctor, how much will such a program cost?" why is it ever considered so unnecessary to make a careful estimate? To those of us who follow this method, any other seems the sheerest folly. What is your answer? I will tell you mine: "I will go over the proposed services individually and in detail and try to arrive at a fee which will closely approximate the cost to you."

With my assistant's help, I fill out the estimate form. I identify the tooth and surface, determine the type of restoration and estimate the individual fee. At the end of the list, I write, perhaps: "Four conduction anesthetics, $20; six infiltration anesthetics, $18." I then add the column and says, as I hand the form toward the patient, "The items that are printed at the top of the form are usually necessary before it is possible to make a real diagnosis and estimate. These have been taken care of now in your case. Those following represent the services which I feel that you need. The numbers represent the teeth and their surfaces and the type of work needed is written after each. Of course, *you* do not understand those details of our business, but it gives you a better picture of the amount of repair needed to give you the best care possible at my hands."

Three courses are open to the patient: 1. He may say, "When shall we start?" 2. He may say that he would like to follow the plan suggested, but the stock market or business conditions prevent it now. 3. He may acknowledge the probable impossibility of his being able to enjoy that type of care.

How do we proceed?

1. In answer to the question "When shall we start?" I ask for the appointment book, find out the days and the time of day most convenient for the patient and make sufficient appointments ahead through the weeks on those convenient days, and at the convenient hours mentioned, to complete the case. The patient then knows that he has a regular date, say, every Monday and Thursday morning at 10 o'clock until the service is completed. He is told of the advisability of arranging as long appointments as he can spare and as are consistent with the nature of the work. He is told that

we try to meet our appointments promptly and will appreciate his doing the same. He is invited to change his appointments by advance notice if necessary. He is asked how he can arrange the payment for the proposed services. If he says, "In any way that is customary with you," or words to that effect, he is told that he will receive a statement on the first of every month and we will expect his check promptly.

2. In answer to a statement regarding temporary lack of funds, the patient is advised to have done such temporary work as is imperative for his present comfort and keep the complete service in mind until he can see his way clear to proceed. (I have had cases completed from two to five years after the first consultation.) I have recently employed the financial service provided by the Dental Acceptance Corporation, and I explain to this type of patient the possibility of financing his dental work as he does his automobile or his house contract, that is, by monthly payments to a financing company. Many substantial business men will proceed with a rather large dental program financed in that way who would not let you proceed if they felt that the whole obligation would become due within two or three months.

3. In answer to the man whose financial prospects are poor, I ask, "How much do you feel that your situation will permit you to spend for the health of your mouth? If you can give me an idea as to what you can spend either now or over a period of a year or two, I will see whether I can render you a desirable service at that figure. If I cannot, I will tell you so."

These dialogs occur frequently in my office. If a patient hesitates or appears ill at ease in deciding, I make it easy for him. I say, "Why don't you hold your decision for a few days; talk it over with the family and take your time to be sure what you want to do? If I work for you, I want to have your confidence. I don't want to hurry you into something that will prove a hardship to you and cause you to distrust my motives. Just remember that your health is more important than your money, so if you feel that you cannot trust your purse in my hands, please don't trust your health there."

To me, that is just good sense—nothing mysterious, nothing misleading, nothing objectionable.

How does this type of service benefit the patient? Its greatest value to the patient is in its salutary effect on the dentist himself. It makes him concentrate his attention on the health needs of the case in hand and reminds him of every detail of information needed for a good diagnostic effort. It shows the patient the type of office that he has ventured into and adds to the confidence that he was given by the patient who referred him. How does it benefit the dentists? First, there is great psychologic value in the accurately prepared diagnostic chart. Patients appreciate its thoroughness and expect the same thoroughness in details that they do not understand. The very hearing of numbers dictated to the assistant prepares the patient to expect extensive repairs. Secondly, the dentist's failures to retain patients will be cut in half, I am sure, by the use of the chart, and those who cannot be held after this type of diagnosis often drift back into his office a few years later fully convinced of his value. Further, the dentist attracts a constantly rising quality of patients, and therefore finds the raising of his fee scale a simple matter. And, lastly, the whole train of unpleasantnesses which follow

any indefinite or misunderstood fees are eliminated.

Before I digress to take up some side lights on this service, I wish to tell you what some other men have said in its favor and answer for you that burning question, "In making my estimate, what shall I charge?" In general, the answer was written years ago by Thomas P. Hinman, of Atlanta, Ga. "Every bit of service should pay its just reward based on this one sound doctrine: Would you be willing to pay a like fee to some one else for the same service?" Or, as we might say: Do not accept a good fee for poor service; neither must you knowingly establish a poor fee for a good service. No one can answer the question for you specifically without knowing all about you, your ability and the type of patient you are now attracting. What I charged two years ago when estimating costs is not what I am charging now, and I expect my fees to be higher two years from now. The only thing that will cause my fees to stand still or be reduced will be failure of my office to continue to attract patients.

The law of supply and demand is at work in dental practices just as inexorably as in any other field. To assist you in getting a basis of estimation, I should say that the very addition of the diagnostic chart and estimate blank to your routine would improve your service to the community to the extent that you would be justified in estimating each individual case 10 per cent higher than you would have charged for individual and unrelated services of like detail. If a 10 per cent increase in your income is acceptable, think this over and give it a trial. You can always discontinue it if it proves unprofitable.

There is only one way to know whether we are properly remunerated, and that is to give thought and study to the subject so that we may conduct our practices in an acceptable business-like manner. We know that we will receive only such compensation as we ask, that much and no more. The adoption by the members of the profession in general of improved methods of handling the business part of their practices will result in a continued advancement of the professional part, and also afford a substantial increase in income, which will make for better dentistry, because it will enable us to have better equipped offices and will make it possible for a larger number of the profession to do postgraduate and research work. An increased income will stimulate the morale, increase our courage and incite us to greater effort in our chosen work. It is frequently said that a dentist should not think of, or worry about, his fee while operating. That is true, and the surest way to prevent worry is to know before the operation is begun that a profitable fee is assured.

Dr. LeGro, of Detroit, in recognition of the value of a thorough and thoughtful record of diagnostic findings, said, "Fortify yourself with these facts. They are the backbone of enthusiasm, success and courage in yourself. You radiate confidence and your patient takes more stock in you and is willing and glad to follow your suggestions on your own terms."

I hope I can digress from the subject without detracting from the suggestions that I desire to leave with you.

Someone is thinking, "But how can you handle the patient who drops in for a slight emergency treatment and then asks you to look over all of the teeth to see if anything is needed?" You can handle this type of case easily after sufficient practice and judgment has been acquired. If the patient is on your established list, and one who has sufficient con-

fidence in you to excuse a mistake on your part, you might humor her; but why make the mistake? If you are conducting your practice efficiently, she is on your regular prophylactic reminder list, and you can say, "Mrs. Blank, I have stolen the time that we have used now. I will have to examine your mouth thoroughly at your next prophylactic appointment." If the patient has had no or little previous work done, no mistake will be permissible. You will say frankly, "I cannot do that safely for either you or myself. The loss of prestige that I would suffer by giving faulty snap judgment, with later embarrassing changes, is *my* reason for refusing to do this for you. *Your* reason that I should not comply with your request is that you cannot afford to have me making mistakes in your health program."

This sounds so simple to me, and is accepted so readily by all types of patients, that I cannot conceive of any dentist's feeling the necessity of making cursory examinations. Always have a thorough prophylactic treatment first and ample reserved time for a thorough examination. Will your patients pay you for it? If you start making a thorough diagnosis after a thorough prophylactic treatment, your patients will pay you gladly, and you will find new faces at your door because you are giving greater attention to your patients than the usual practitioner. News travels. Try to do something differently and better than the crowd.

A few men have sponsored the "per hour" basis of service to the patient, letting the patient know plainly that such is the basis of the fee. Such a plan has its limitations and annoyances. You then become a party to clock watching employment, on a par with the woman who solicits washings or scrubbing at hourly rates. I once had to live down the "You charge $10 an hour, don't you?" idea, and I see no places where it improves on the contract method of quoting fees. I remember many uncomfortable encounters with patients who could not see why I should charge for time spent in laboratory work during their absence and who said I worked only fifty minutes for them twice last month but had charged for two hours. Others said, "But you spent ten minutes talking on the telephone," etc.

The only argument that I have ever heard advanced favoring the hourly fee basis was that it was fairer to the patient because the difficult cases paid their way and simple cases reaped the benefit of early care. I am going to turn that argument into one for a careful diagnosis. I am becoming quite expert in foreseeing difficulties, and it has become an interesting game that I play while I work to see how close I can come to anticipating or apprehending the difficulties that are to be met. If a hasty examination is made, any fee quoted has little chance to be fair to both parties. If a man is honest with his patients in diagnosing, he will be honest with them in completing their services. It is not necessary to quote an unalterable fee in 90 per cent of cases. I make a written estimate of each case and at the top of my form is the following notice: "All estimates are approximate, but effort is made to approach the exact cost as nearly as possible." This notice is not for the patient's benefit, but to serve as a constant reminder to me to be careful about missing the little details that cause trouble. A careful, intelligent diagnosis of the needs, and an estimate based on that knowledge, plus a background of experience, which is necessary for good judgment, are a combination that make for good dentistry, good fees, pleased patients and contented dentists.

I urge you to improve your diagnostic

methods and perfect your ability to make fair, profitable estimates and contracts. Leave nothing to guess work about the service needed. Leave nothing to chance about the patient's financial cooperation. "To give is more blessed than to receive" applies only to charitable cases.

DISCUSSION

J. Ben Robinson, Baltimore, Md.: This subject is of great importance, particularly at this stage of our professional progress, when so much interest is being shown in suggested improvements in dental office management. The policy outlined Dr. Miller has developed by taking advantage of experiences in practice, stimulated by a keen interest in the work in which he has been engaged. This is an illustration of what is taking place in thousands of dental offices in this country, in the organization of the business aspects of practice, not identical in detail or administration, but equally effective. While Dr. Miller has as his main purpose the presentation of a fundamental business transaction, it is significant that he has coupled with this business transaction a distinct professional responsibility and has emphasized this responsibility by giving professional service precedence in his discussion. This indicates the duty of the dentist to his patient and to himself, and logically demonstrates that the duty of the dentist to himself presupposes a professional service of value to the patient. Diagnosis is the first duty that confronts the dentist in the treatment of his case. By diagnosis, we do not mean a casual observation of possible lesions of the hard tissues of the mouth, but a more comprehensive investigation of the mouth and its adjacent parts for the purpose of a complete restoration of the masticatory apparatus to normal function, as well as attention to any pathologic process that might in any sense menace the good health of the patient. This service is gradually assuming a degree of importance which should have distinguished dental practice in the past. We have seen an evolution in this phase of the subject from the time when dentistry looked on the isolated tooth as the basis of mouth examination, followed by an era in which the oral cavity as a whole limited the interest to be taken in oral diagnosis, and on to the present time when more intelligent treatment demands that the entire human system be considered in examination if we expect to render the best service. Only upon such a thorough diagnosis may we intelligently recommend treatment and estimate values, and without such an understanding of true conditions, no intelligent or honest treatment may be undertaken. I agree with the emphasis placed on this thought by Dr. Miller, and go further, asserting that, without an interested professional attitude on the part of the dentist, no guarantee of honorable business success may be looked for in any case. Dr. Miller has pointed out that his method of examination and diagnosis is used to excite the interest and attention of the patient and to introduce the discussion of a financial agreement. I feel that indirect approach to a discussion is oftentimes a questionable procedure, since indirection to some carries a suggestion of reserve that might be interpreted as questionable procedure and, unless extreme care is exercised, always weakens a case. Dr. Miller says: "The very hearing of numbers dictated to the assistant prepares the patient to expect extensive repairs." I prefer a direct intelligent approach in conversation to determine the patient's attitude toward the service to which he is entitled. It would seem much better to complete a diagnosis carefully, make a record of all mouth conditions and estimate approximate fees, transcribing findings on a work card, which should be available at all times during operations, and when this is done, say pointedly to the patient, "I have completed a diagnosis. Perhaps you are interested in the character of work to be done, the time it will take and the costs to you." This introduction opens the question and gives opportunity for a clear presentation of all needs, as well as a statement of the financial policy employed in the office. In the main, the patient visiting the dentist goes in response to an urge for service. That urge fully comprehends his personal conception of his needs. It is not assumed that he really understands the demands in his case, but that his limited knowledge must be supplemented by additional information, which the dentist should supply. Salesmanship in the commercial sense is not only unnecessary but also objectionable. Attention of the patient to a broader comprehension and understanding of his own personal needs is the duty of the dentist. To explain intelligently to a patient the need of an amalgam restora-

tion in a molar tooth as a preventive and utilitarian measure is not salesmanship in the terms of selling an amalgam restoration, but is education in that it changes the patient's idea of the value of such an operation. Salesmanship in dentistry is the act of changing a patient's emotional attitude toward a unit of service that may be looked on in terms of graduated monetary values. Education of a patient to an intelligent appreciation of dental service is based upon an appeal to the good sense and reasoning powers of the individual and has to do at all times with the health and comfort of the patient. In salesmanship, the interest of the patient may or may not be served. In education, only the well-being of the patient is involved. In the first case, the assessment of fees may be the prime object, and the patient usually pays for all he gets. In the second case, a distinct service is involved, for which a fee may be charged, but the service to the patient cannot be evaluated. All of us have met the patient on whom high pressure salesmanship has been used and his conception of dentistry and the service that dentistry renders the public is always low grade. That patient who has accepted the recommendation of a dentist for restorative work in terms of meeting the health needs of the individual in the broad sense of health conservation is always an asset to dentistry. I feel, therefore, that direct statement without recourse to suggestion and indirection is tremendously valuable to the present and future of our profession. W. H. Hamilton, in his "Economics," has this thought in mind when he says, "A technic which is only a bundle of tricks for carrying on a trade must be bent to human uses and this opens the door alike to wisdom and to folly." One other thought is suggested to which I would take exception because of the possible harm that may come to dentistry in its employment. I refer to recourse that may be had to financing organizations which may provide financial relief to the unfortunate. I do not believe that any profession can afford to encourage the use of financing organizations to make immediate dental service possible to those who are unable to meet current expenses in addition to prompt payment of dental bills. I deplore the American system of future commitments in business which, while temporarily augmenting business in general, ultimately fixes a tremendous burden on the average man, who, through taking advantage of such opportunities to gratify immediate desires, finally comes to grief. This credit system has developed a very questionable, unstable business condition, which, in the opinion of many, is an important factor among the causes of our present depression in business. Any patient who cares to take advantage of any opportunity to secure funds to pay for dental service has a right to do so, but, in my opinion, suggestions for securing such funds should not come from the dentist. It again opens the door to those who might not be so scrupulous as they should be. It is my belief that the time is not far distant when dental office management will have become standardized, at least as regards the fundamental principles of good business. This forward step must be taken by dental schools in teaching dental office management, since from this source only can widespread improvement come to the profession in general. I do not look for a scientific formula or a detailed procedure that will lend itself to substitution for common sense and judgment. This gradual crystallization of sentiment in favor of better training in systematic procedure can but reflect to the credit of dentistry and a better service to the public, provided the urge for such improvements is prompted by unselfish noncommercial ideals.

Ralph R. Byrnes, Atlanta, Ga.: The remarks that I shall make on Dr. Miller's paper will assume more the color of a general observation on the subject of economics and ethics than the nature of a specific criticism on special points of the paper. As Dr. Miller has written a paper which, in a general way, gives expression to or hints of the current economic and ethical ideas of a large number of dentists, I should like to have this discussion received as a criticism of the attitude of a group rather than as a strict review of Dr. Miller's paper. In my opinion, the subject of dental economics and ethics, a subject of vital importance, has been so mishandled (not to say manhandled) by the majority of dentists that, I am frank to confess, I find the growing attitude in the matter quite annoying. The prevailing attitude excludes from the consideration of economics everything that does not in some way or other work toward the material welfare of the dentist himself. No longer is it a question of what is best for the patient. The topic has degenerated into a discussion of ways and means of devising

all kinds of ingenious chicanery to plump the bank account of the dentist. The practice of dental economics and ethics, and particularly ethics, should be a personal thing with every dentist, and a set method of conduct cannot be flaunted indiscriminately before all classes of patients, and made to apply to all. The dentist should prove his ethics by his actions. There is no necessity for saying to the patient, "Behold, I do this for such and such a reason, and that is good." What would one think of a minister of the gospel or any other equally influential person saying to his audience, or implying on every available occasion, that his conduct is open and above board? Virtue, in the conduct of a dental office, as elsewhere, needs no megaphone tactics. Dr. Miller epitomizes an attitude in which I do not concur when he says: "I shall try to visualize the advantages to be obtained by conducting the business-like approach to your practice as a logical interpretation of your patient's desire to trade hard cash for the services you are capable of rendering," and he asks if that is plain. Yes, it is only too plain. I do not think it is the attitude shared by the more worth while people who are in need of dental service. I have a good enough opinion of the average man to think that the idea of "trading hard cash for dentistry" does not enter his head. If he has any subtlety of character at all, he will think of the dental treatment that he is getting only as a benefit to his health and comfort, and will not approach the subject from a standpoint of barter. I think that it is bad psychology, as well as an exhibition of lack of delicacy, for the dentist to discuss first, and as a matter of first importance with patients, methods of payment. People have not yet become standardized enough to respond in exactly the same way to a thing of that kind. With some patients, it may not be amiss to mention payments as a thing of prime importance, but other patients may rightfully resent such procedure. If I were seeking the services of a physician, and he should mention the matter of remuneration at the beginning of our consultation, I am quite sure that I should seek the services of some gentleman less concerned with his fee. Also, I wish to raise a respectful objection to the idea of becoming involved in the business affairs of a dental acceptance corporation. The thing the dental profession needs today more than any other is true dignity, an unassuming dignity that will win the respect of patients and will enhance the status of the dentist in society. Such commercial exploiting as we see in the dental profession today can work no possible good. And I say this with the full appreciation of the value of economics and sound business methods, garnered from years of experience in that field. In another part of his paper, Dr. Miller says: "The only thing that will cause my fees to stand still or be reduced will be the failure of my office to attract patients." I do not agree with that statement. I think values alone should determine the dentist's fees, rather than the number of patients. The patient should pay no more than the work calls for, as far as we can determine its value, and should not be expected to pay monetary tribute to the dentist's personal magnetism and powers of verbal conviction. I think that Dr. Miller's idea of a diagnosis or history form is a good one. I believe that a complete history of each patient should be taken by the dentist, in order that he may better minister to the needs of the patient from the standpoint of his oral health. I do not see much value in the fifth item on the form calling for "a picture of the patient's tendencies as revealed by a history of parentage." Would it not be better to substitute here a record of any general diseases from which the patient has suffered, or is suffering? I agree with Dr. Miller thoroughly in his views on the "per hour" basis of charging. The avowed practice of the "per hour" basis is not wise, and is another of those persistent influences in the dental profession which is insidiously undermining the respect which dentistry has, or should have, from the public. It took the dental profession scores of years to rise above the plane of a mechanical trade, and just as it is about to enjoy an improved status, it is being thrown back to its original position by the introduction of subterfuge and pseudo-machine-made ideas of ethics and economics. This open "per hour" basis is only a mild part of the wide-spread mania of faulty economics and ethics being fostered by some schools of thought which have arisen, and are promulgating ideas which not a small number of dentists are consuming. This is not so much a reflection on these schools of thought which have come into the field of dental practice as it is on the considerable number of the profession who have allowed themselves to

be so persuaded. Fundamentally, there is no difference between dental economics and any other kind of economics. I have enough respect for the dental practitioner to think that his common sense will enable him to apply a system of economics to his office, without this type of outside assistance.

Dr. Miller (closing): On the form which I use (introductory chart of information affecting diagnosis and treatment), there is a place for the various diagnostic records that are filled and a notation as to what has been done with them if they have been removed from the file. If transillumination and pulp testing afford any positive information, it is recorded with the roentgen-ray findings since I feel that these are kindred diagnostic agents. Because Dr. Robinson thinks my approach to the business side is a little too abrupt or unnecessarily abrupt, I feel that possibly he works mostly for women patients. You have noticed throughout dental literature that a great many times the patient is spoken of as "she" and the services rendered as "her work" because we, perhaps, do work for more women than men. Probably 60 or 65 per cent of our patients are women. I purposely took a man patient to illustrate this method of diagnosing and estimating dental services needed. The average man likes to have you come to the point. He doesn't like to have you "beat about the bush." I am implying that I too would suit my phraseology to the type of patient involved. Concerning the suggestion as to having the work card in addition to the estimate form, they, in my office, are the same card. This card is brought to the chair at each appointment, together with the case and financial record card. Every entry is in my own handwriting, abbreviated, of course, but complete, and as the work progresses, the patients know how much has been accomplished. Since they have been told beforehand how much the service is going to cost, there is no financial apprehension on their part and they do not at any time ask me anything about costs. My statement with regard to financing was unfortunate. I do not wish the remark to act as a criticism of the Dental Acceptance Corporation at all. I have not tried their plan enough to criticize it in any way. Three times since the writing of this paper, I have tried to employ it and have found some features objectionable to the patient. I find that I can secure the same accommodations from a local bank at a considerably smaller interest rate. I do find that some business men who were hit pretty hard in the stock market would rather pay a little more interest to an out-of-town financing company than to the local bank where they may even be stockholders. I accept that criticism in the way it was put. Then there was a mild objection to the necessity for any financing scheme. I left a clipping at the hotel giving a report of our hospital in the city of Flint which was $90,000 short at the end of the year, with $124,000 increase in its outstanding accounts for the same period. The hospital superintendent gave as the reason for being unable to collect these accounts the fact that practically all of these uncollected accounts were in homes where there was a car, radio, picture-show habit, washing machines and vacuum cleaners for which men had taken contracts, and every cent of money was tied up for months to come. Now that is a condition that exists and only a condition, not anything that I am to be blamed for, or you; but these people need dental care, and they are of a type not temperamentally able to pay for dental services in a lump sum. Until they get into sufficient difficulty to cause them to stop the time payment method, we are doing them a kindness if we obligate them to the extent that they cannot buy so many nonessentials. Dr. Byrnes, I think, is too hasty. He is as sincere, I believe, as I am, but I shall have to disagree with him definitely. Many innovations are at first discouraged; for instance, the Volstead Act has not been exactly popular. It is the same with this matter, some proceed and some hold back. I think that we are on the way ahead. Dr. Byrnes is holding back. He criticized one half of a quotation. Preceding the portion that he read was one which stated the value of a thorough diagnosis from a health standpoint. At no place in my paper did I put money ahead of service. He says that he believes the average man does not have any idea about money in his head when he comes to you. It must be in his head or it would not be the first thing to come out of his mouth. He says that if he were sick, he would consult the best physician he knew, and would not say a word about money. That is just what I would do exactly. That is an emergency. If a patient comes in with a toothache, the emergency repair is taken care

of. If he never pays it, he is taken care of just the same. Extensive dental repairs come under elective surgery, and I would sponsor having a definite remunerative understanding with the patient even as a surgeon would with an applicant who desired plastic surgery for esthetic purposes. I emphasized this in an article entitled "Esthetic Surgery of the Maxillae."[1] Surgeons are just as ethical as we are and no more so. Dr. Byrnes takes exception to my fees, because I say that they are going to be larger two years from now. He insinuates that I am going to raise the fees just because I can. The better I am paid for my work, the better I shall do it. His most surprising objection is to allotting space to the family history on the introductory chart. A man, aged 25, comes into his office, looking as fit and well-fed as I am. He has eight or ten pulpless teeth in his mouth. That man, like myself, possibly has never had a headache or any rheumatism, may get along on five hours sleep at night, and always feels well, and yet Dr. Byrnes would base any care to be given those pulpless teeth on the history of the illness that man has had. I had six pulpless teeth before I was 20. I estimated, on a basis of health, that if I lived to be 80, I would be half way over the hill at 40. I have had all of those pulpless teeth out, and the infected areas thoroughly removed within the last year because I felt that I should not carry that overload of infection past 40, when I have probably started down the hill. I based my retention of those teeth (which threatened such possibilities of systemic involvement) until I was 40 on a family history of long-lived, rugged ancestors. Whether or not his father, mother, uncles and aunts were susceptible to heart lesions or had rheumatism from 35 or 40 on is much more important in the treatment of that 25-year-old patient, than what the young man himself has suffered. There are people who are born with "one foot in the grave," destined to die at 25 years who have no illness up to 20 except a general low vitality. You learn of this tendency through the history of their fathers, mothers, aunts, uncles and grandparents. The most important thing to me in my diagnostic chart is the family history.

1. Miller, W. N.: Dent. Cosmos, 65:942 (Oct.) 1923.

FIXED BRIDGES WITH SPECIAL REFERENCE TO TISSUE CONTACT PONTICS AND INLAY ABUTMENTS*

By ROY O. BOWLES, D.D.S., Charleston, W. Va.

IT is probable that the branch of the healing art known as dentistry had its inception somewhere in remote antiquity in the extraction and replacement of missing teeth. The premature loss of teeth is as old as the race itself, and there is historic evidence that crude attempts to restore these lost organs were made long before the Christian era.

The replacement of the organs of mastication has engaged the attention of the dental profession during the entire development of the science of dentistry, and has progressed through many stages toward the goal of perfection.

During the past few years, the ever-present problem of supplying missing teeth has been greatly in evidence, and much has been written, published and said for and against fixed and removable prosthetic appliances. Each year has brought improvements, and it is reason-

*Read before the West Virginia State Dental Society, May, 1930.

able to expect that many mysteries of the present will be gradually revealed as the goal of perfection is approached.

To the dental profession, the subject is of paramount importance, as we all well know that great damage has been done by its unwise application and by faulty construction.

I know of nothing in dentistry that is attended with a greater degree of satisfaction to both patient and operator than the restoration to health of a badly mistreated mouth, infested with disease and disfigured, and to an approximation of its original beauty.

ways, superior to removable bridgework.

Properly constructed bridges whether of the fixed or removable type are no more sanitary than the patient in whose mouth they are placed. While removable bridgework is ideal in theory, sanitary bridgework is more practical for most patients.

The premature loss of most abutments in fixed bridgework can be traced to faulty articulation and improperly constructed crowns.

The more desirable removable bridges are so highly technical in construction and require such delicacy of adjustment that the necessary expense is prohibitive to most patients.

Fig. 1.—Improperly constructed bridge.

STATEMENT OF PRINCIPLES AND FACTS

The last word has not been said on bridgework, but I am convinced that much of the condemnation of "fixed bridgework" has resulted from faulty technic of the past. I am aware, as you must also be, that the so-called "removable bridge" is not the unmixed blessing that it promised to be.

After careful consideration of the most advanced technics, and consultation with the leading bridge specialists, I am convinced that, in most cases, where bridgework is practicable, fixed bridges can be made as sanitary as and, in a number of

Many of the simpler types of removable bridges supported by cast clasps, which have lately become so popular, are proving a menace to the abutments through lack of attention on the part of the patient, together with undue strain on certain teeth, and this type has done and will do more harm to the teeth than the old fixed bridge ever did.

The crux of the whole subject is the fact that there has not been the general acceptance of correct principles and methods, together with a sufficiently developed technic, that there has been, for example, almost the world over in oper-

ative dentistry, and until this is accomplished, the subject of bridgework will be more or less confusing.

When acceptance of correct principles can be brought about universally, as in operative dentistry, the practice of bridgework will undoubtedly hold a place in dentistry free from criticism.

There is more to be accomplished in successful bridgework than just supplying missing teeth. This may be done technically with reasonable skill, but may fail in its greatest possibilities for comfort and service to the patient.

There is no denying the nervousness of some patients; but many have been found that sound judgment is an outstanding quality; and it has been noticeably true that where there was an abundance of skill but good judgment was lacking, disappointment usually prevailed.

Some mouths are very sensitive to alteration by bridges, and it is a wise operator who foresees all these conditions.

For many years, bridgework has been largely victimized, not only by dentists, but also by dental laboratories and the advertising element of dentistry. It is to be regretted that bridgework offers opportunities of a commercial nature and develops a tendency on the part of dentists to delegate its construction unre-

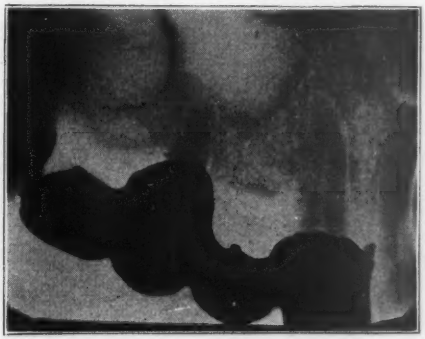

Fig. 2.—Improperly constructed bridge.

unduly imposed on through improperly made bridges, and no doubt much could be gained if the work could be viewed from the patient's standpoint.

There is no profession, or a specialty of one, that has enjoyed freedom from failure in its practice, and it would be disastrous for its future welfare if it had.

It is doubtful that there is a more valuable possession in the make up of a professional man than good judgment, and where success in practice and loyalty of patients have been most enjoyed by members of our profession, it will be servedly to other hands. This has limited its greatest possibilities.

One of the most discouraging elements in the practice of bridgework is the inclination, on the part of many dentists, some prominent ones, to regard the construction of bridges as less important than operative work. Worse still, they have allowed dental laboratories to dictate to them as to how bridges should be made. I have heard many eminent dentists say that the dental laboratories could make better bridges than dentists could themselves. The truth of this statement, I am

unwilling to concede. It is a woful admission, reflecting discredit on the dentist, and dishonor on the profession. When the same men have remarked that four or five years was the average life of a bridge, they were only passing silent judgment on their own operations, as it is not unusual to find bridges that have served patients satisfactorily for a score or more years. The morale of these men, whether the result of their own experience or that of others, has had an unhealthy influence on the practice of bridgework, especially among the younger men, to whom much credit must be given for the enthusiasm and advancement of recent years. With these conditions confronting them, men who have been leaders in this work have had a struggle to maintain the ideals of which bridgework is worthy and to uphold the dignity of its practice.

In presenting this paper, I do not claim originality as to the ideas expressed regarding the "new tissue contact bridge," as the possibilities of this work were first called to our attention by Dr. Maves, Edward T. Tinker and others, a number of years ago. At that time, a number of bridges were inserted, and the excellent results obtained indicated that if they would stand the test of time, a new era in the construction of fixed bridgework had begun. Some of those cases today present the same perfectly sanitary conditions and the tissue surrounding the roots are in the pink of condition, giving every appearance of the presence of the natural tooth. Others have taken up the work, and valuable suggestions have been made in the technic which have simplified the application of the same principle.

The great number of bridges of this type now being inserted by the most skilled operators throughout the middle west with most gratifying results, and the fact that all the leading dental colleges are teaching this technic, have inspired me to hope that I may assist you in applying it to the best advantage in your practice.

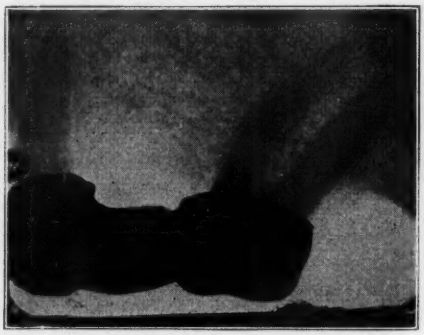

Fig. 3.—Improperly constructed bridge.

WHY FIXED BRIDGEWORK HAS BEEN CONDEMNED

The principle of fixed bridgework has been criticized and condemned because clinical evidence has repeatedly demonstrated that fixed bridges have failed, not because they were fixed, but because of inadequate support, poorly constructed

abutment pieces and insufficient attachments, together with a disregard for pathologic conditions and no attempt to maintain physiologic tone.

As an example, we will take the "old fixed bridge," built of solder and swaged cusps for the posterior dummies, one of the most disgusting appliances ever devised for the human mouth. It is plainly filthy, as the patient cannot possibly cleanse all surfaces or remove decaying food from the recesses. I have yet to see a bridge of this type which is not covered with a scum of débris and decomposed matter, varying in thickness in accordance with the thoroughness employed by the patient in brushing the surface. It has been one of the most frequent causes of traumatic occlusion and loss of abutment teeth, and the fact that the very common use of these methods has come down to the present day is deplorable.

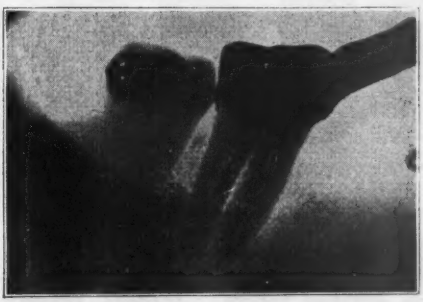

Fig. 4.—Improperly constructed bridge.

No wonder fixed restorations have been condemned when such replacements are being made. But is it just to condemn the practice because some dentist was ignorant, careless, incompetent or avaricious or a combination of all these? While we all realize that patients would be better without restorations of this kind, it is a satisfaction to know that serviceable, hygienic and satisfactory replacements can and are being made. This being the case, it becomes a duty to those of us who believe in the "new tissue contact bridge," to point out the obstacles that have hindered its progress, and the misconceptions that have impeded its understanding and where they originated.

THE REMOVABLE BRIDGE

As long as there are variations in ideals and ability, it is useless to urge the profession to use one kind of bridgework or to expect various kinds to be executed with the same degree of perfection.

It would be unfair to say of any dentist who still constructs the old fixed bridge that he is ignorant of its shortcomings. It would be just as unfair to him to say that he did not wish to be informed regarding the new tissue contact bridge, and that he took no interest in remedying the defects of the old fixed bridge. The reason for their lack of knowledge of the new tissue contact bridge is that they have been led from the right track, and by the removable bridge.

Every one will admit that removable bridgework has its place in dentistry, but, in recent years, an over-amount of enthusiasm has been manifested on the part

of some members of our profession on behalf of the removable type of bridge. It was designated in some instances by a nomenclature possessed of neither professional dignity nor euphony, but since "there is nothing in a name," this should not be taken seriously or be made to detract in any way from the merits that such a type of bridge might possess. It has been with the removable bridge as with other new devices coming to the practice of a profession: it was heralded with overenthusiasm by some, and an unfavorable reaction has been the result.

When the removable type of bridge was presented and it was asserted that it replaced fixed bridgework, conservatism would have been of great value, as it requires only time for such adventures to run their course.

It would be folly for me to expect any one type of bridge to meet all conditions; nor shall I debate the exact indications or contraindications of fixed or removable work. I do wish to point out that the modern trend is toward a more general acceptance of fixed bridgework, the only obstacle being that too great emphasis has been placed on removable bridgework as its alternative and superior.

WHY SANITARY FIXED BRIDGEWORK, ANATOMICALLY CONSTRUCTED, IS DESIRABLE

Fixed bridgework had degenerated into a mere staple necessity. When it was indicated, there was nothing else for the case—that was all! Patients accepted it merely because they wanted "the gap filled." The result is reflected in the average fixed bridge fee today, a mere pittance as compared with fees for removable bridgework. Then came the new tissue contact bridgework, with cast anatomic units, and glazed porcelain tips next the soft tissues.

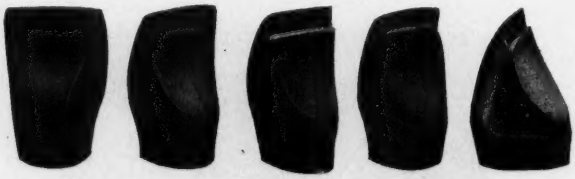

Fig. 5.—Preparatory models for incisors and cuspids.

Fig. 6.—Preparatory models for bicuspids and molars.

Patients do not want this type of construction because they have to have something done for them. When they understand the difference, they want it because it spells a clean, wholesome mouth, as well as being esthetic.

As dentists, we are learning that better practice is built by placing the kind of bridgework that patients actually want, when they have it explained to them.

In the new tissue contact bridgework, the chewing surface of every tooth on the bridge is carved just like that of a natural tooth, so as to give the opposing teeth their normal masticatory exercise.

The surfaces of these teeth next to the tongue are carved so that the bridge feels natural to the tongue and it is easier to talk clearly. Then, too, there is no space between the bridge and the gum to collect filth because of the difficulty of removing food débris.

The bridge teeth themselves are shod with porcelain, next to the gum, and there is no substance to which the delicate tissues of the mouth take so kindly as glazed porcelain, nor one that can be so easily kept clean.

Fig. 7.—Porcelain tip pontic.

MISCONCEPTIONS REGARDING ABUTMENT

It is not for me or any other dentist to discuss the indications or contraindications for any certain type of bridge abutment. We can emphasize the fact that the new tissue contact bridge is clean.

Good articulation and balanced occlusion are easily obtained in the new tissue contact construction. We can show that contraction of the gold between the abutments can be almost entirely eliminated, but beyond that we cannot go, except to point out that any type of abutment judged suitable for any fixed bridge by a dentist can be used for the new tissue contact bridge.

REQUIREMENTS FOR SUCCESSFUL BRIDGEWORK

In fixed bridgework, certain basic rules are fundamental to successful application, such as correct diagnosis, good health, proper sanitation, sound mechanical principles, conservation of pulps, conservation of tooth structure when dealing with vital teeth, avoidance of irritation of soft tissues, proper distribution of abutments favorable to stress and strength required, correct and balanced occlusion, proper types and forms of pontics and proper contact points.

A bridge so constructed will be comfortable and need not be favored during mastication. It should, when possible, restore facial expressions and harmony.

THE THREE-QUARTER CROWN

The three-quarter crown construction, in crown and bridgework, was at first very unsatisfactory, but, in recent years, more pleasing results have been obtained. The majority of failures were due mainly to the fact that anchorage in the tooth was not made deep enough; the walls were too tapering, and preparation for retention and cementation was inadequate.

PREPARATORY TECHNIC: INCISORS AND CUSPIDS

1. A disk is used to cut a flat plane on both mesial and distal surfaces, tapering toward the incisal edge lingually.

2. A plane is ground on the incisal edge and a sufficient amount removed from the lingual wall to clear the bite and provide for the employment of gold.

3. A little step is cut across the lingual side of the tooth, just slightly inside the incisal edge, with a medium-sized stone or an inverted cone bur. I have almost discarded the step mentioned, as I cannot see any advantage in its use. I have sub-

stituted a pit in the cingulum, which gives a three-dowel post attachment.

4. A slight groove is cut on the mesial and distal sides, parallel to the first third of the incisal labial plate, by using taper cross-cut fissure burs, keeping the two grooves parallel and ending at a point just clear of the gingiva.

5. A slight bevel is established around the entire periphery as a finished line. In the lingual pit or cingulum, retention is accomplished by the use of a 21-gage threaded iridioplatinum wire sunk into the pit; or it can be secured in the casting. I have discarded the shoulder at the gingiva, as I have tried to develop something the average dentist can construct; and I wish to emphasize the point that if an attempt is made to cut a shoulder at the gingival border, or a finished line, and that construction is placed in the hands of 100 dentists, there will be a very small percentage of cases which will be adapted properly to that shoulder or finishing line. Since giving up the cutting of shoulders in my practice, I have been relieved of a great deal of trouble.

Fig. 8.—Porcelain tip pontic.

BICUSPIDS AND MOLAR TECHNIC

1. With a safe edge disk, the mesial and distal walls are cut to parallel one another or slightly tapering toward the occlusal. The disk should be held so that on the upper teeth, the walls will slope toward the buccal, and on the lower, toward the lingual aspect.

2. A sufficient amount is removed from the occlusal surface and the sulci to provide for gold 1.5 mm. thick. In cutting across the occlusal aspect on the lower teeth, the operator keeps well forward so that the larger bulk of the lingual cusp will remain. In the upper, the technic is reversed, permitting the larger bulk of the cusps to remain. The cusps are never cut flat. The more prominent the cusps, the greater the resistance to lateral strain.

3. The enamel is removed from the lingual wall to within 1 or 2 mm. of the gingiva, except in long bell-shaped teeth, where it should extend only to the fullest circumference of the tooth. In the bicuspids and molars, the gold should extend over the buccal-occlusal contour from 3 to 5 mm., or just clear of the gingiva.

4. A slight bevel is established around the entire periphery as a finish line. Care must be exercised not to create a shoulder or a decided step.

INLAY ATTACHMENTS

An inlay without more strength of attachment than the ordinary inlay used in the filling of teeth would not be sufficient for use in bridgework. The function of an inlay attachment is twofold: retention and prophylaxis. The ideal has certain qualities that should be striven for in all cases: (1) pulp conservation; (2) the least amount of tooth destruction consistent with extension for prevention; (3) strength to withstand the displacing forces of stress; (4) restoration of the tooth to its normal form; (5) simplicity of preparation and construction; (6) safety to peridental tissues during preparation; (7) esthetics, and (8) easy fitting and placing.

Since the gold inlay plays such an important part in fixed bridge construction, I think it inadvisable, in an article of this nature, to attempt to discuss the various technics, but wish to refer you to a series of articles by H. W. Gillett, A. J. Irving and others.[1]

The slice preparation no doubt meets the foregoing conditions more than any other, when used in connection with fixed bridgework, as it provides a broad surface to attach the pontics to, with but little danger of soldering at or too near the inlay margins, which is very important in fixed bridge construction.

Fig. 9.—Porcelain tip pontics.

1. Irving, A. J: J. A. D. A., System of Cavity Preparation Which Meets Requirements of Modern Inlay Practice, 17: (Sept.) 1930. Gillett, H. W., and Irving, A. J.: Dent. Items Int., 49:669 (Sept.), 765 (Oct.), 853 (Nov.), 943 (Dec.) 1927; 50:1 (Jan.), 83 (Feb.), 167 (March), 253 (April), 339 (May), 421 (June), 499 (July), 607 (Aug.), 681 (Sept.), 759 (Oct.), 839 (Nov.), 926 (Dec.) 1928; 51:1 (Jan.), 85 (Feb.), 167 (March), 329 (May), 409 (June), 493 (July), 585 (Aug.), 677 (Sept.), 769 (Oct.), 847 (Nov.), 925 (Dec.) 1929. Knapp, K. W.: Modern Conception of Proper Bridge Attachments for Vital Teeth, J. A. D. A., 14:1027 (June) 1927.

THE SHELL CROWN

There are occasionally times when the three-quarter crown and inlay is deemed too weak in fixed bridgework. We then resort to the full crown, which is the strongest attachment that we have, but should be used only when no other attachment will meet the requirements. The full crown is indicated on very short teeth or where the coronal portion is imperfect in structure, form or position.

The old shell crown has for years been for many dentists the only dependable abutment. It is not ideal, but its strength and durability have been proved. There are many bridges anchored with shell crowns which have given service for twenty-five or thirty years. We no doubt wonder if the inlay will produce the same results.

The shell crown has been abused by many dentists in miserable preparations and construction, but this should not be charged against the principle. The same dentists would no doubt do worse if they were to attempt an inlay abutment.

As long as dentistry is practiced, the shell crown[2] will be used by some, and we believe that it can be made to fit the tooth and do little if any injury to the mouth.

WAXING AND CASTING

Waxing for the inlay may be done directly, indirectly or semiindirectly.[3] Time will not permit me to enter into the details of all or any one of these methods, but the operator may decide the methods by which he obtains the best results.

Many phases enter into casting: expansion, investment, boiling out wax, wax elimination, etc.,[4] all are essential to the casting of good inlays.

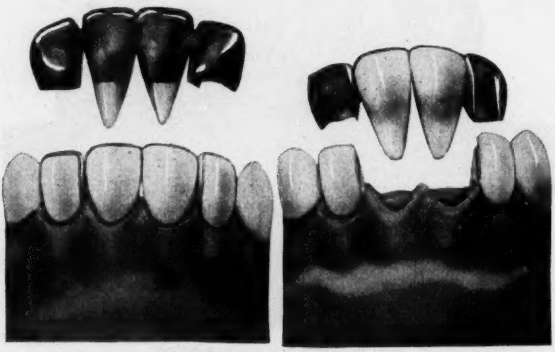

Fig. 10.—Improperly constructed porcelain pontics. (Courtesy of American Dental Co.)

PONTICS

The construction of pontics, or so-called dummies, has received less careful study and less time than any other phase of bridgework. The factors to be considered are: (1) strength; (2) anatomic form; (3) functioning in mastication; (4) cleanliness, and (5) esthetics.

2. Mitchell, J. R.: Bridge Abutments on Vital Teeth, J. A. D. A., 14:2261 (Dec.) 1927.

3. Sundby, E. J.: J. A. D. A., Gold Inlays, 17:2113 (Nov.) 1930.

4. Taylor, N. O., and Paffenbarger, G. C.: J. A. D. A., Current Inlay Casting Technics, 17:2058 (Nov.) 1930.

Pontics may be constructed of gold or porcelain, or of gold and porcelain. In the gold-porcelain combination type,[5] we have a pontic which meets the foregoing requirements, more general than the other two, as they have their limitations.

Up to the last few years, bridges were made the pontics of which consisted of a porcelain facing ground to fit a scraped cast, then backed, soldered and assembled in one operation. Perhaps a great many of these same pontics are still used by some. In this type of bridge, little or no attention was paid to the occlusion, contour, cusp relations, contact points, embrasures or hygiene.

I feel sure that the pontics used in the old fixed bridge fail completely to meet the requirements as do those now being used in the new tissue contact bridge. There has been misconception about pontics used in the new tissue contact bridge in its earlier development, and a porcelain root was placed in the socket of a freshly extracted root. This has gradually diminished among early enthusiasts. As they began making the roots shorter, they also began extracting before the bridge was commenced, and now every one knows that the new tissue contact bridge does not mean a porcelain root bridge. Another misconception was that it was necessary for porcelain pontics to be of convex shape. Now, we all know that this is out of the question in the anterior region where we have firm, well formed ridges. Some went so far as to surgically prepare a socket or a depression for the insertion of a convex tip. Now, the convex tip has given way to the saddle formation, and it is quite different from the old gold saddle, since, when they are properly glazed, with properly formed interdental spaces, they can be kept perfectly clean, and the saddle facings appear to be growing out of the tissues, which take so kindly to the highly glazed surfaces, while the lingual anatomy will make the tongue feel at home.

The pioneers in this field of work spent a great deal of time and effort in pointing out the essentials of a permanent, esthetic and hygienic pontic. With these essentials in mind, no porcelain should be brought in contact with the mucosa unless it has been glazed previously. Ground porcelain, unless reglazed, will absorb the fluids of the mouth, which ferment and act as an irritant to the mucous membrane.

Glazed porcelain also presents a smooth surface to the tissues, with no danger of mechanical irritation, and the tissues surrounding remain clean and normal.

There are two types of porcelain pontics, the root tip and the saddle or ridge lap. The former is placed within the

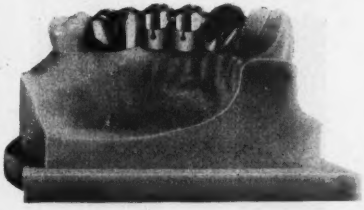

Fig. 11.—Saddle type porcelain pontics.

Fig. 12.—Saddle type porcelain pontics.

5. Doxtater, L. W.: Dent. Items Int. 51:527 (July) 1929.

alveolar socket, the latter in contact with the crest of the ridge after it is healed.

The porcelain tip variety, when employed, should be high fusing (2,300 F.), so that, if it is necessary to grind or alter the surface at the final sitting, it can be reglazed again with a lower fusing porcelain. These tips should come in contact with the gum to prevent food collecting under them, but never pressing hard enough to cause irritation.

This type of pontic has its limitations and the practice of implanting porcelain tips in the sockets immediately after extraction is fast sinking into disuse, because of the injudicious use of this type of pontic by placing it too far in the

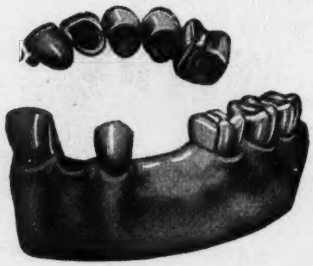

Fig. 13.—Porcelain root replacing recently extracted lateral incisor and porcelain tipped teeth restoring two missing bicuspids.

socket, and, as a result, encountering secondary infection, excessive absorption and exposure of the porcelain tips. After recognizing its limitations, using it only where indicated, and not allowing the root to extend more than one fourth of the depth of the socket, we have a pontic assuring the finest esthetic results and maintaining the maximum gingival contour. Also, very little absorption takes place, and the gum tissue hugs the porcelain root very closely, remaining in a very healthy condition.

The latter type is used where extractions have been made previously, and the gum tissues are healed without irritation and with no space left for the collection of food particles. It also reproduces the tooth form both lingually and labially, the porcelain extension with a slight contact on the tissues at or near the crest of the ridge. Enlarged interproximal spaces are obtained through which the bristles of a toothbrush or a tape are readily passed, and the fact that highly glazed porcelain is nonirritating makes for a healthy condition. The porcelain saddle, as stated above, is used for the anterior teeth, and if the facing is ground to lap the ridge in such a manner that it presents a normal appearance, and the ground surface reglazed, being carried to

Fig. 14.—Semifixed lug rest.

an overglaze, the result is certainly pleasing in appearance.

The gold portion in the anterior teeth should be carved as nearly like the natural teeth as possible, the effect being appreciated by the patient. In the posterior teeth, the gold portion should reproduce the occlusal marking and general contour of the natural tooth as far as possible. Embrasures should be exaggerated, as they form escapements through which food passes during mastication, immediately relieving the tooth of this stress, massaging the underlying gums and aiding materially in maintaining the health of that tissue.

In fact, we often see soldered contacts

as broad buccolingually as are the abutments themselves; and usually these cases are a straight line mesiodistally on the lingual surface from one abutment to another. When we realize what a strain we are placing on these abutments by tying them together, and thus doubling the stress under which they must labor, we will recognize the necessity of giving them every advantage possible. The gold part of pontics, even two or three together, should be cast in one piece. We not only can secure a more accurate reproduction of the natural tooth, but the only solder used is employed in joining the bridge to the abutments. This solder point should be small and circular in form, the contact point being its center, and should occupy only the occlusal third of the interproximal space. Never should the solder extend from the pontic to the margin of the casting, as this would make it impossible to finish the margin of the casting after it is seated in the cavity. The cavity should be extended farther for an abutment on the angles of the tooth than for an ordinary inlay, an area resulting that is more easily kept clean, and the excursion of the food in mastication naturally cleansing the surface of the inlay.

The final unit of the fixed bridge to be considered is the means of uniting the pontics with the abutments. At present, there is a tendency again to resort to the semifixed appliances, uniting one end of the pontic rigidly to a retaining abutment piece, and the other by an occlusal lug rest, pin and socket or ball and socket.

This practice should be maintained except in the anterior bridges, or where abutment teeth are loose, or are in long spans.

The method that I find most satisfactory is as follows: After the anterior abutment is cast, I make a round opening on the distal surface about the size of a 20-gage wire and undercut it with an inverted cone bur, polishing the abutment well. After the pontics are carved and ready to cast, the surface of the abutment and opening is coated with aromatic spirits of ammonia. Then the dummies are waxed to the abutment, the wax being carried into the undercut opening. I then remove the abutment with the waxed dummies, invest and cast. By this technic, we secure a loose joint, one that will not pull out, and, at the same time, will have movement enough to compensate for any movement of the abutment teeth.

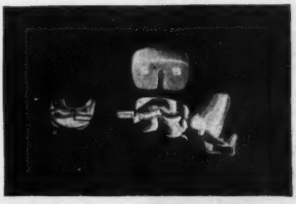

Fig. 15.—Semifixed lug rest.

Fig. 16.—Semifixed lug rest.

IMPRESSION TAKING

To attain the foregoing results, it is necessary to take impressions carefully. This is of vital importance in the making of bridge dummies. When cuspid and incisal regions are involved, a complete impression and models must be made of both the upper and the lower jaws, because we obtain balanced articulation, and the

molars are a determining factor in length and in cusp inclination. The impression is then taken in plaster or solvite. It is always best to remove the impression material and abutments intact when possible.

OCCLUSION

The necessity for proper occlusion and articulation is one thing which every system of bridgework must take into consideration, and each can if it will. Herein lies one of our weakest points, for if the articulation is not well balanced in the lateral and forward thrusts of the mandible, certain teeth bear all the force, and if such teeth are a part of the bridge, the result will be a serious disturbance in the retention tissues, with destruction of the peridental membrane, dissolution of the alveolar process and subsequent loss of such teeth. It matters not how beautiful the finished bridge looks, it will be a failure if this fundamental is not attained.

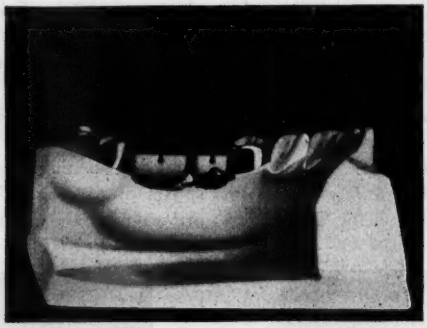

Fig. 17.—Porcelain tip using sanitary pontics.

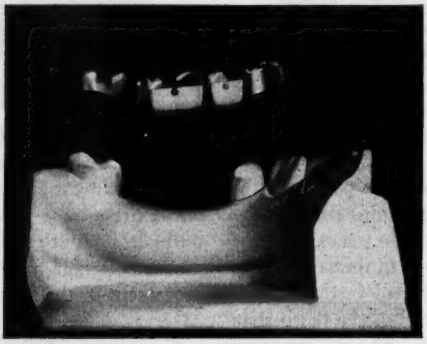

Fig. 18.—Porcelain tip using sanitary pontics.

In the old fixed bridge, the unsanitary defects are not so serious as the risk of trauma to abutment teeth, as well as opposing teeth. The occlusal surface of the old fixed bridge is formed by swaging

gold plate to cusps from a manufactured die plate, they being all alike, with no relationship to the occlusal surfaces required for each individual case.

In the new tissue contact bridge, the lingual-occlusal surface of the porcelain pontics is carved in wax and cast. It is easy to secure perfect articulation, and individual cusps can be reproduced in the carving. With the use of an articulator which permits lateral movements, paths are formed by the opposing cusps, and these can be modified without destroying essential cusp detail.

In this manner, cuspal interference is obviated, and occlusal trauma reduced to a minimum.[6]

REGLAZING TEETH

The technic of reglazing porcelain, although very simple, should be strictly adhered to in grinding the porcelain tooth. A stone of medium fine grit is used, and both tooth and stone are kept submerged in water. The water acts as a vehicle, and

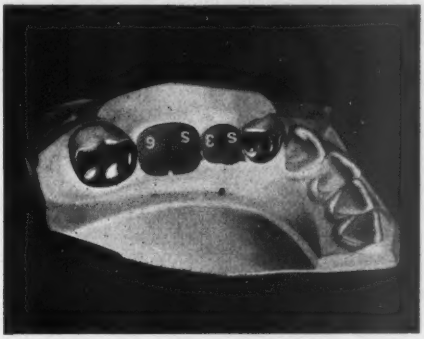

Fig. 19.—Porcelain tip using sanitary pontics.

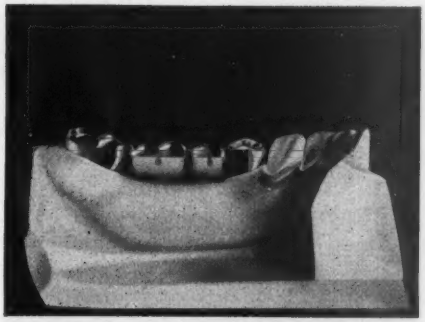

Fig. 20.—Porcelain tip using sanitary pontics.

6. Maves, T. W.: Crown and Bridge Work in Relation to Balanced Occlusion in Open Bite Cases, J. A. D. A. 15:919 (May) 1928.

the agitation set up by the turning of the stone carries away all abrasive material, preventing their lodgment in the porcelain pores.

The tooth should then be scrubbed with a hard bristle brush in running water and thoroughly dried. A small amount of dry powder is placed on a napkin and rubbed into the surface pits and pores. Then some of the powder is mixed to a thin consistency with distilled water and glycerin, equal parts, and, with a fine camel's hair brush, the ground porcelain surface is coated with the mix, and vibrated as quickly as possible, which prevents the glaze from becoming streaked.

To fuse, the tooth is placed on silex or platinum in such a manner that the part to be glazed will not be in contact with another tooth or any part of the tray. The tooth is then placed in the porcelain furnace, and the current is broken when the temperature reaches 1,945 F. In a furnace without a pyrometer, a pellet of pure gold is used, the current being broken when the gold melts.

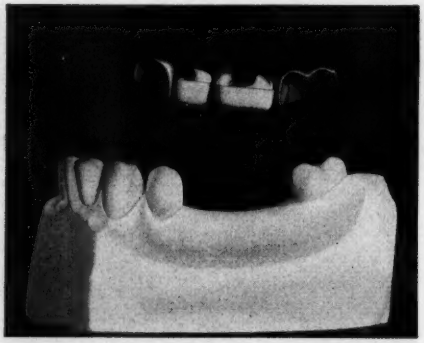

Fig. 21.—Porcelain tip using sanitary pontics.

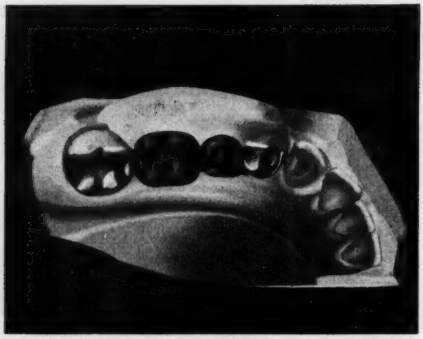

Fig. 22.—Porcelain tip using sanitary pontics.

SERVICE

Patients expect service, and the new tissue contact bridge is of a type that should give service. It is our duty to see our patients at frequent intervals until satisfied that the occlusion is perfect and the bridge is functioning properly. All occluding surfaces should be tested with articulating paper for riding points that increase the strain. It is our duty to teach the patients how to clean bridgework, and even though we feel that the appliances that we make will offer every assurance of favorable performance, our duty does not cease until we have instructed the patient as to the absolute necessity of observing scrupulous sanitation. Let me impress on you that if we are to render the proper service, we must inspect bridges often.

SUMMARY

1. The occlusion must be favorable. The importance of this cannot be overstated. Correction may be made either by grinding or, where this will not suffice, by rebuilding the entire occlusion to a new relationship, i. e., opening the bite.[6]

2. The amount of tooth structure to be removed in the preparation of abutment teeth should be the smallest possible without sacrificing necessary strength.

3. All pathologic conditions should be eliminated. No diseased tooth should be used as an abutment for a bridge.

4. Abutments and pontics should be constructed in harmony with our understanding of tooth anatomy.

5. Complete accuracy must be attained in casting, impression taking, model making and soldering. The bridge must go to place without a strain on abutments.

6. The occlusion should invariably be perfected by grinding with stones and milling with carborundum paste in the mouth after the bridgework is in place.

It has been my experience that when these essentials are complied with, a long term of health and service may be anticipated. Long spans, where more than two pontics are carried on two abutments, are usually unfavorable. Success here will depend on the extent to which the six foregoing conditions can be complied with, as well as the quality and quantity of the alveolar bone.

That it cannot be kept clean is true of a great deal of bridgework for two reasons, i. e., improper construction and lack of intelligent and systematic effort on the part of the patient. It has been my observation that where filthy bridgework is found, the patient's own teeth are in similar condition. Any reasonably constructed fixed bridge can be kept as clean as the natural teeth, if the patient and dentist will make the effort.

I hold in the highest esteem the men who through years of labor have developed and perfected the removable bridge. It occupies a very important place among our methods of tooth replacement. I find it impossible to agree that the fixed bridge is a menace and that the movable-removable bridge is the only remedy. They both fail, and with equal frequency, but I think that the factors of fixation and mobility have little to do with their failure.

If this subject is placed on a higher plane, patients may be better served than they have in the past, when its practice was hampered by irrational methods, commercialism, fads and a general half-hearted interest.

When we have succeeded in freeing this subject from the bonds that have hindered its progress, we then can claim to be truly professional men, having at heart the best interest of those we serve.

"RESIDUAL INFECTION"*

By A. B. DUSINBERRE, D.D.S., Clifton Springs, N. Y.

IN the December, 1930, issue of THE JOURNAL, page 2235, J. O. McCall has a paper entitled "Residual Infection" and profusely illustrated by roentgenograms and photomicrographs showing various changes from the normal, which he interprets as being caused by infection remaining in the jaws after the removal of teeth.

After a study of the illustrations in the article cited, I offer an interpretation contrary to that of Dr. McCall's.

Much surgery has been practiced on alleged foci of infection existing in jaws after the removal of teeth, but there are few published histologic and bacteriologic studies on the materials removed at operation by which this surgery can be justified. The question of residual infection is one of the most important confronting the profession, meriting the attention of those who are in a position to carry on researches in dental pathology. I wish to express appreciation of Dr. McCall's excellent paper, excellently illustrated.

A knowledge of the extraordinary physiologic changes which take place in the jaws beginning with the first dentition and continuing through to the elimination of the teeth and to healing should warn us to use great care lest we interpret some detail in these changes as pathologic. No part of the human body is subjected to so much stress and strain, not to say abuse, as the jaws.

After reading Dr. McCall's paper and studying his illustrations, I venture to suggest that the changes are mildly pathologic in character and due to surface infection and irritation, usually mechanical, rather than to bacterial infection in the jaw tissues; in other words, the condition is transitory and subject to external influences.

These conclusions have been arrived at in the face of the obvious difficulties of interpreting half-tone reproductions of roentgenograms and photomicrographs and the lack of a detailed description of the physical examination of the suspected area in the individual case.

First of all, we have a loss of function of the part, which results in a radical change, extending in some instances over a long period of years. Dr. McCall's article calls attention to the fact that the overlying tissues in question are normal in appearance and symptomless, but nevertheless, the most important point to be considered is the mechanical irritation present in every edentulous area. Tissues support dentures; adjacent teeth can be subject to irritation; food impaction is inevitable, if artificial restoration has not been made; tissue beneath a fixed bridge cannot be considered physiologically normal, etc. We have here pictures of the inflammatory changes in the tissue, but, we ask, what are the various causes of the inflammation?

*A reply to Dr. McCall's paper of this title published in THE JOURNAL, December, 1930.

We are told that bone can be deposited in the presence of infection. We have seen the regeneration of bone in the presence of osteomyelitis of the jaw, and I am sure more marked evidence of inflammation could be shown histologically than has been presented here, the same being true of the healing of any tooth socket, none of which escapes some evidence of infection and, incidentally, inflammation.

The presence of epithelial rests in the jaws which may develop into cysts does not mean that the infection is the actuating agent of such development. These cysts are sterile up to a certain point and improve following infection, and that by a pyogenic organism. With all the changes taking place about the edentulous jaws, one would normally expect to find considerable fibrous tissue.

At the spring meeting of the research association, it was demonstrated by a worker that the surface epithelium undergoes radical changes when subjected to various types of irritation which normally occur in the mouth. Why cannot this irritation manifests itself deeper within the soft and hard structures?

Fortunately, Dr. McCall did not go beneath the cortical layers of the mandible; nor did he invade the maxilla to any extent. When interpreting depth, we must keep in mind that the roentgen-ray evidence can be misleading if we do not consider the contour of the ridge at the site in question. In some of his cases, we are shown inflammatory evidence immediately beneath the surface epithelium, overlying a suspected area in the bone.

An attempt will be made to bring out these points as we seem to think they occur in the cases presented by roentgen-rays and photomicrograph. Figures 1-3 show a textbook picture of a dental cyst arising from an epithelial rest. Regardless of the origin of the latter, infection need not be the activating agent in the development of the cyst.

In Figures 4-6, we have an isolated tooth which contains an extensive restoration. It may support a denture. The tissue posteriorly (indicated by arrow) may support a denture or may be subjected to food impaction, or there may be gingivitis about the cervical margin of the tooth, etc. We are given a microscopic study just beneath the epithelium, but no study of the depression of the bone. Any of the foregoing could be factors in producing this picture.

In Figures 7-11, the arrow designates a thin area in the bone. This region no doubt supports some type of denture, which is an irritant. The histologic section shows strands of fibrous tissue which are imbedded in the bone, and some cellular infiltration. The healing of such an area and the irritation of a denture, as well as some degree of constant resorption under stress, could explain the picture. The bone itself appears normal.

Figures 12-15 show a section through the mucoperiostium. There is considerable fibrous tissue and some cellular infiltration. The section was taken from beneath a fixed bridge. Assuming that this tissue appears normal, which is doubtful, and is symptomless, we cannot say that the area is free from the external influences with which we are all familiar, nor are we acquainted with the healing of the area after the extraction of the teeth, which could explain the presence of fibrous tissue. This tissue can replace normal structure when there is a so-called disuse atrophy. What would be found at this depth if one were to make sections of definitely inflamed tissue so often found beneath bridges? Unfortunately, there was no bone study

presented of the area indicated from which the diagnosis was made.

In Figures 16-18, first of all we have a tooth showing marked evidence of severe trauma, and no doubt the clinical evidence is as severe. Approximating the root is an area of compensatory hypertrophy of bone, Nature's effort to support the tooth. Posterior to this is an area of resorption. We can imagine the various types of external irritation which might affect this area. We are shown a marked cellular infiltration over an area of normal bone which is being resorbed by osteoclasts. Whatever irritation is causing the resorption accounts for the whole picture.

Figures 19-20 present normal condensed bone showing no evidence of an inflammatory process. It is, no doubt, another example of compensatory hypertrophy. There is no mention made of the area of rarefaction anterior to this, which we would think the more important.

Figure 21 shows simply a thin area due to loss of structure, a not uncommon finding. This is a good example of the care that must be taken in diagnosis, and I consider it, with Figures 24 and 27, to be the most important studies in the series.

Careful consideration should be given the case shown in Figure 22. There is evidence of marked resorption of bone. The alveolar process is melting away owing to some external and perhaps internal cause. Picture Nature trying to accommodate herself to such a change, with the fine ragged edges subjected to external pressure, without the help of considerable cellular infiltration and the replacement of normal fibrous tissue. Consider the length of time this has possibly been going on and the time it has yet to go on, with the possibilities of small spicules breaking off and being exfoliated through the soft tissue. We cannot expect normal tissues under such circumstances. Edentulous mouths showing the same roentgen-ray pictures are quite common. The same explanation can be made of Figure 23 to a lesser degree.

Figures 25-26 show the retromolar triangle. If *Staphylococcus albus* was found here, this area communicated with the mouth in some way. Perhaps by bone fragments working through the surface; perhaps by way of the gingival trough of the adjoining tooth; and perhaps by contamination. I believe one would call this a process of repair as there is evidence of Nature's reparative organs present. It must be remembered that after the removal of an impacted lower third molar, there is considerable time involved even before the external evidence of repair disappears in the mouth. I have seen spicules work out of this region a year after operation. It would be well to take note of the relative positions of teeth and ramus and judge the picture of the soft tissue posterior to the second molar.

Figures 27-28 show a simple perforation of the alveolar process, and the only tissue that would be expected to occupy such a place is fibrous tissue.

HEAT TREATMENT OF TERNARY ALLOYS CONTAINING GOLD AND NICKEL*

By JOHN S. SHELL, B.S., San Francisco, Calif.

THE binary alloys of gold and nickel form a continuous series of solid solutions when annealed slightly below their solidification range for a sufficient length of time, and when these alloys are subsequently cooled slowly, this solid solution decomposes into a eutectic mixture. This crystalline change can be followed by examining the structure microscopically, but quantitative results are difficult to obtain by this method. The physical properties also change during the transformation and may be arbitrarily taken as a measure of the amount of crystal change.

The Rockwell hardness test was chosen as the simplest and most satisfactory determination for following the change in physical properties as an indication of the crystal transformation. The results shown in Table I indicate that this variation in hardness is sufficient to give a fair indication of the results of heat treatment.

The binary alloys are hardest in the form of solid solutions, and as this solution decomposes, the hardness decreases. The change in hardness does not occur suddenly at any definite temperature but develops slowly, increases to a maximum and then proceeds more slowly again until no further change is noted. The maximum rate of change usually occurs over a range of about 300 to 400 degrees. The nickel content was varied from 5 to 25 per cent at intervals of 5 per cent and the alloys were tested after four different heat treatments to obtain the data in Table I. The quenched alloys were prepared by pouring into iron ingot molds and were then transferred to cold water as rapidly as possible. As these results vary only slightly from the data obtained from specimens that have been annealed for one hour at 1,500 F., it may be inferred that the transformation has probably not proceeded appreciably during the interval required in transferring the alloy to the quenching medium. The furnace-cooled alloys were melted under borax and cooled over a period of about two hours from 1,500 to 400 F. This slow cooling does not allow sufficient time for a complete transformation of the alloys containing more than 10 per cent nickel, as can be seen by comparing these hardness numbers with those of the specimens that have been annealed for twenty-four hours at 700 F.

The temperature at which the transformation takes place according to Fraenkel and Stern is between 650 and 780 C., or 1,200 and 1,430 F., for the alloys of the compositions used. The high annealing temperature, 1,500 F., is considerably above the transformation range. Alloys that are annealed at 1,500 F. should be in the form of solid solution, and alloys

* Contribution from the Division of Physical Metallurgy, College of Dentistry, University of California, aided by a research grant from the American Dental Association.

annealed for twenty-four hours at 700 F. should have been completely transformed to a eutectic mixture.

Such a crystal transformation offers the possibility of obtaining dispersion hardness by a carefully controlled heat treatment. No such phenomenon has been observed in these alloys although many experiments were made with different cooling rates. All heat treatments tended to produce softer alloys than those obtained by high temperature annealing followed by quenching. (Nowak describes the hardening of similar alloys.[1])

The tendency of metals to separate, from a solid solution to a eutectic mixture, is probably affected by the addition of a third metal, and the solubility relationship of the added metal to the two metals forming the solid solution should determine the type of effect that will be produced. If the added metal is soluble in both constituents, the tendency is to preserve the metal in the form of a solid solution at a lower temperature than would be the case in the absence of this metal. If the added metal is insoluble,

1. Nowak: Ztschr. f. Metallk., 22:94.

TABLE I.

TABLE I.—ROCKWELL HARDNESS OF BINARY GOLD-NICKEL ALLOYS *

Nickel (per cent)	5	10	15	20	25
Poured and quenched	65	92	99	105	105
Annealed at 1,500 F. for two hours	65	94	103	105	105
Slowly cooled for two hours	62	92	87	95	94
Annealed at 700 F. for twenty-four hours	70	90	84	85	80

* Rockwell "B" numbers.

TABLE 2.—ROCKWELL HARDNESS OF BINARY GOLD-NICKEL ALLOY

Annealing Temperature (F.)	15 Per Cent Nickel	50 Atomic Per Cent Nickel
1,600	104	105
1,500	104	105
1,400	103	104
1,300	100	97
1,200	94	89
1,100	90	88
1,000	85	87
900	85	87
800	85	87
700	85	87
600		

TABLE 3.—ROCKWELL HARDNESS OF TERNARY GOLD-NICKEL-COPPER ALLOYS

Annealing Temperature (F.)	50 Atomic Per Cent Nickel: 10 Per Cent Copper	50 Atomic Per Cent Nickel: 15 Per Cent Copper
1,600	99	98
1,500	99	96
1,400	99	96
1,300	99	96
1,200	99	96
1,100	99	96
1,000	97	96
900	94	95
800	94	94
700	94	94
600	94	94

TABLE 4.—ROCKWELL HARDNESS OF TERNARY GOLD-NICKEL-SILVER ALLOYS

Annealing Temperature (F.)	15 Per Cent Nickel Per Cent Silver					50 Atomic Per Cent Nickel	
	1	2	3	5	10	5	10*
1,600				100	98	102	102
1,500	102	101	100	95	80	100	95
1,400	101	100	98	90	62	96	87
1,300	98	91	86	80	53	89	79
1,200				71	45	80	72
1,100	92	85	80	65	41	73	67
1,000	91	83	81	61	40	69	63
900	89	82	75	58	39	66	62
800	86	73	69	56	39	64	62
700	74	67	58	54	39	63	62
600	74	67	58	54	39		

*Numbers in horizontal line indicate silver per cent.

the opposite tendency may be observed. The metals that were added to the gold-nickel alloy were chosen with this idea in view.

Copper is soluble in both gold and nickel in all proportions although the formation of the gold-copper compound AuCu was found to interfere with the results. Silver is soluble in all proportions in gold and very slightly soluble in nickel. Iron is soluble in both constituents in the amounts used, and cobalt is soluble in all proportions in nickel and only slightly soluble in gold.

TABLE 5.—ROCKWELL HARDNESS OF TERNARY GOLD-NICKEL-COBALT ALLOYS

Annealing Temperature (F.)	15 Per Cent Nickel Per Cent Cobalt				50 Atomic Per Cent Nickel	
	1	2	3	5	5	10*
1,600					105	105
1,500	100	100	100	101	99	99
1,400				96	93	93
1,300				91	88	88
1,200	89	89	89	87	85	83
1,100	91	90	85	83	82	80
1,000	87	92	86	81	80	78
900	83	84	78	80	80	78
800	76	79	78	80	80	78
700				80	80	78
600	76	79	78			

*Numbers in horizontal line indicate cobalt per cent.

TABLE 6.—ROCKWELL HARDNESS OF TERNARY GOLD-NICKEL-IRON ALLOYS *

Annealing Temperature (F.)	15 Per Cent Nickel Per Cent Iron		50 Atomic Per Cent Nickel
	5	5	10†
1,600	103	103	103
1,500	103	103	102
1,400	100	102	101
1,300	94	98	99
1,200	88	93	96
1,100	82	89	93
1,000	80	85	90
900	80	83	88
800	80	82	88
700	80	82	88
600			

*Rockwell "B" numbers.

†Numbers in horizontal line indicate iron per cent.

Two alloys of gold and nickel were used as stock alloys, one containing 15 per cent nickel and the other 22.8 per cent, which is 50 atomic per cent of each metal. Various proportions of the third metal were added to this stock alloy, ranging from 1 to 15 per cent. The base metal was added to the gold nickel alloy, melted under borax and poured into an iron ingot mold. After remelting until the ingots were homogeneous, they were annealed at 1,600 degree intervals to the minimum of 600 F., and hardness determinations made after each heat treatment. The results are shown in the accompanying tables. The annealing time was increased from two hours at 1,600 F. to twenty-four hours at 700 F., to allow equilibrium to be attained at the lower temperatures.

The addition of 5 per cent copper produced an alloy that was somewhat softer than the binary alloys and became considerably softer after the low temperature annealing. Increase in the copper content prevented much of this softening during the heat treatments at lower temperatures probably owing to the formation of the compound AuCu. Experiments were conducted with the idea of obtaining the softening influence of the gold-nickel transformation before the hardening effect of the AuCu compound formation could occur. The silver-nickel transformation for the 15 per cent nickel alloy occurs at about 725 C. or 1,340 F., while the AuCu compound forms slightly below 400 C. or 750 F. By annealing between these two temperatures, the softening effect of the nickel content

should not be vitiated by the hardening effect of the copper compound. As can be seen in Table 3, the softening in this range is the greatest for the gold-nickel-copper alloy, but is not so great as might be expected. This is probably due to the effect of the copper in prolonging the solubility range of the gold-nickel alloys.

Silver produced the most marked result of all of the metals investigated. The decrease in hardness of the 15 per cent nickel alloy containing 5 per cent added silver from B100 at 1,600 F. to B54 at 700 F. indicates a considerable crystal transformation. The temperature at which the softening started was also increased by the addition of this metal. Annealing at 1,600 F. was necessary to produce the maximum hardness in the alloys containing 5 per cent silver, and the softening proceeds rapidly as the annealing temperature is decreased.

The addition of cobalt indicated a much smaller change in hardness, possibly due to the close similarity between cobalt and nickel, which may increase the tendency to preserve the alloy as solid solution. Iron produces the least change in hardness between the high and low annealing temperatures, especially in the high concentration of both iron and nickel.

These results indicate that the addition of small amounts of metal may radically affect the alloy as regards its heat treatment qualities without changing the properties of the alloy in the cast condition to any great extent.

RÔLE OF THE DENTIST IN GOITER CASES: OBSERVATIONS ON THE DENTAL CONDITION OF SIX THOUSAND GOITER PATIENTS*

By ISRAEL BRAM, M.D., Philadelphia, Pa.

THE presence among my case records of the histories of several young dental surgeons who were referred to me for the treatment of exophthalmic goiter is the impulse for the presentation of these remarks. In two of these patients, the disease developed almost immediately on the appearance of a molar abscess. In the course of time, these patients recovered, and, on being discharged, urged that I publish my experiences with dental conditions in goiter work. This contribution is based upon a series of 6,000 patients out of more than 12,000 goiter cases seen and studied during a period of over two decades.

*From the Bram Goiter Institute, Upland, Pa.

THE THYROID AS A DISEASE FIGHTER

A competent observer remarks: "The thyroid is not essential to life, but it is synonymous with making life worth living." To human beings the thyroid is a vital organ. Witness the thyroidless individual, or cretin, who, though capable of "vegetating" to the age of 30 or 40, is a dwarfed, pot-bellied idiot, useless to self and society. The functions of the thyroid gland are many. They pertain to the metabolic processes, the heat-regulating mechanism, interglandular and circulatory equilibrium and, particularly,

to physical, mental and sexual development.[1] What interests us here is that the thyroid plays a major rôle in immunity processes. In the presence of infection, it is this function that frequently leads to thyroid disease.

In all focal or general infections, the thyroid participates in defending the body against germs and their toxins. And since mouth infections are most common, it is small wonder that the dental apparatus is frequently incriminated in the search for the etiology of goiter. In its task of fighting infections, the thyroid may or may not become enlarged, and with or without functional derangement. A furtherance of this process may lead to definite goiter formation and frequently to a form of functional disturbance characterized either by deficiency of secretion (hypothyroidism) or by an excess, expressing itself either as toxic adenoma (hyperthyroidism) or as exophthlamic goiter.

The citation of a few deductions by other observers will serve to emphasize the immunity function of the thyroid gland. Among these observers, Roger and Garnier[2] call attention to a temporary swelling of the neck as a result of such infectious disease as measles, scarlet fever, typhoid, influenza and pneumonia.

The effect on the thyroid of remote focal infection occurring in the gallbladder, appendix, uterine adnexa and the kidneys is frequently stressed in the literature. Bonilla and Velasco,[3] for instance, describe a case of thyroid hyperactivity that was absolutely intractable to the classic methods of treatment. The discovery and eradication of a kidney stone complicated by pyelitis resulted in cure of the hyperthyroidism.

McCarrison,[4] of the British Public Health Service at the Pasteur Institute at Coonoor, India, has for more than thirty years demonstrated the microbic origin of goiter. His extensive experiments were conducted not alone on animals, but on human beings as well, including himself.

In a series of experiments, Cole and Womack[5] point out that acute general as well as focal infection practically always leaves an impress on the thyroid. These observers have developed a toxin containing a group of four organisms which, when injected subcutaneously into dogs, will produce marked thyroid changes, structurally and functionally, in 100 per cent of the animals.

Cole, Womack and Gray[6] further point out that the basal metabolic rate was heightened out of proportion to rises in temperature in animals injected with large amounts of toxins and organisms, indicating thyroid overactivity as the result of these injections, and they found that following infections and toxemias of a severe nature, the same changes take place in the human thyroid as occur in the thyroid gland of animals, but to a

1. Bram, Israel: Goiter, New York: The Macmillan Company, 1924. Goiter Prevention and Thyroid Protection, Philadelphia: F. A. Davis Co., 1928.

2. Roger, H., and Garnier, M.: La glande thyroide dans les maladies infectieuses, Compt. rend. Soc. de biol., 50:889, 1898.

3. Bonilla, E., and Velasco, S. F.: Hyperthyroidisme reactionnel par pyolite lithiasique, Rev. franc. d'endocrinol., 6:370, 1928.

4. McCarrison, R.: Thyroid Gland, New York: William Wood & Co., 1917; Experiment in Goiter Prevention, Brit. M. J., 1:94 (Jan. 15) 1927; Simple Goiters, New York: William Wood & Co., 1928.

5. Cole, W. H., and Womack, N. A.: Reaction of Thyroid Gland to Infections in Other Parts of Body, J. A. M. A., 92:453-457 (Feb.) 1929.

6. Cole, W. H.: Womack, N. A., and Gray, S. H.: Thyroid in Infections and Toxemias, Am. J. Surg. 6:221-229 (Feb.) 1929.

lesser extent. They also found that thyroid hyperplasia of the type which can scarcely be differentiated from that seen in exophthalmic goiter is not uncommonly observed in the thyroid glands of patients dying from acute infections.

Olesen,[7] of the United States Public Health Service, after a survey of thousands of school children in Cincinnati, Ohio, finds evidence that one of the immediate effects of communicable disease is a simple temporary enlargement of the thyroid gland. Within a comparatively short time after a child recovers from a communicable disease, he is no more prone to changes in the thyroid size than is a child who has not been infected.

Olesen and Taylor,[8] in an examination of approximately 12,000 boys and girls in twenty-eight localities in Connecticut, for the purpose of determining whether there was a relationship between potential foci of infection in teeth and tonsils and thyroid enlargement, found that sound teeth were slightly more frequent among girls than among boys; that teeth without decay were found more frequently and consistently among the thyroid-normal children of all age groups, and, conversely, slight and marked decay were more common among individuals having enlargement of the thyroid.

Osborne,[9] of Yale, is particularly emphatic in stressing the relationship of mouth infection to disease and in particular to thyroid abnormalities. He points out that many physicians and dentists do not recognize the menace of a pulpless tooth, whether it has become so from disease or has been devitalized. He defines the term "mouth infection" as a chronic infection of the teeth, gums or tonsils. This includes Vincent's disease or trench mouth, pyorrhea, decayed or dead roots and allied conditions. Adults have more pulpless teeth than formerly, due to devitalization. Also, infection develops under many crowns and bridges. Osborne rightly insists that a healthy thyroid gland is essential to the normal development of teeth in children. The filling of the canals of dead teeth is no assurance against infection, since, after a few months, they show the presence of microorganisms. Even a negative roentgen-ray report is not dependable, for the roentgenogram does not indicate infection in the pulp cavity or the beginning of infection at the tooth apex.

Osborne recalls to mind that bacteria in the canal of a tooth cannot be attacked by the body protective forces in the blood, as the blood cannot enter the tooth canals. Infection, therefore, when involving the pulp canal can be absorbed by the lymphatics, reach the circulation and become a menace. The germ generally found in the pulp cavity of a dead tooth is *Streptococcus viridans,* the organism that most insidiously damages the heart and frequently causes some form of arthritis. Osborne quotes the work of Price,[10] which embodies a vast amount of research work on tooth infections. Speaking of roentgen rays and dental infections, Price states:

> The roentgen rays will not necessarily reveal the presence of infection either in soft tissue or in hard . . . the extent of bone absorption is not necessarily the extent of bone infection. . . . I believe a single-rooted tooth with a well filled pulp canal can, under certain conditions, be a source of systemic dis-

7. Olesen, R.: Thyroid Gland and Communicable Diseases, Pub. Health Rep., 43: 3009 (Nov. 16) 1928.

8. Olesen, R., and Taylor, N. E.: Further Studies on Relationship of Endemic Goiter to Certain Potential Foci of Infection, Pub. Health Rep., 42:606-619 (March 4) 1927.

9. Osborne, O. T.: Mouth Infection, M. J. & Rec., 130:551-554 (Nov.) 1929.

10. Price, W. A.: Dental Infections, Cleveland: The Penton Publishing Co.

turbance. . . . The evidence at hand strongly suggests that soluble poisons may pass from the infected teeth to the lymph or blood circulation.

Osborne concludes his remarks by intimating that there is no such thing as a healthy pulpless tooth and states that the dentist has a greater opportunity to prevent disease than has a practitioner in any other department of medicine.

It is obvious that, in the event of doubt regarding the vitality of teeth, conservation is often dangerous in the long run. Among the many others who call attention to the need for the eradication of doubtful conditions in the mouth is Faught.[11] He states:

Fig. 1.—Left: Case of exophthalmic goiter in which considerable dental correction was regarded as an important constituent of treatment. Right: Same patient several months after treatment was instituted. The patient is now normal in every respect.

There is still a tendency among dentists to save at any price obviously damaged teeth. Furthermore, they are prone to use as bridge abutments, without preliminary roentgen-ray examination, apparently sound teeth, the effect of which is to light up dormant infective processes and to provoke the development of apical and periapical infection. . . . The value of the removal of foci of infection and the efficiency of this means of arresting and curing disease will depend on the thoroughness with which the search for such foci is made, and the completeness of their eradication.

11. Faught, F. A.: Focal Infection in Relation to Medical Problems, Am. J. M. Sc., 172:718 (Nov.) 1926.

NATURE OF THE MICRO-ORGANISMS INVOLVED

In an interesting study of teeth infections in patients suffering with mental disorders, Henry and Doyle[12] find that infection in peridental tissues is very common. The most frequent source of error by others has come from the attempt to make cultures from the apices or from the sockets of extracted teeth. This is due to the practical impossibility of obtaining

Fig. 2.—Left: Case of exophthalmic goiter of long duration and extreme severity. Right: Same patient, discharged cured about a year later, as a result of treatment in which dental correction played an important rôle.

clear cultures after extraction. Periapical cultures obtained by special operative procedures or cultures from root canals of teeth *in situ* require methods of procedure that are not practical, and the chances of contamination are too great to permit the use of these methods on a large scale. Consequently, these observers conducted

12. Henry, G. W., and Doyle, Mary C. H.: Focal Infections in Teeth, Am. J. Psychiatry, 8:915-928 (March) 1928.

experiments to determine whether or not the outside of a tooth can be sterilized without destroying the organisms which might be present in the root canal or pulp chamber. In this, they were successful. They conclude that focal infection frequently occurs in root canals and pulp chambers of teeth; that more than 50 per cent of teeth ordinarily extracted contain streptococci and 10 per cent contain hemolytic streptococci; that pathogenic streptococci occur with equal frequency in otherwise normal individuals, and that dental roentgenograms give accurate indication of infection in about 75 per cent of cases only.

Fig. 3.—Left: Exophthalmic goiter in a girl of 12, presenting caries of almost all the teeth. Vincent's infection was present, more marked at the gingival borders of the teeth. Right: Patient after dental correction performed by Philip B. Label, of Philadelphia. The upper and lower incisors are restored to normal appearance and function with porcelain jacket crowns. All posterior teeth are corrected with amalgam restorations. Articulation and occlusion are now normal. This patient, through general medical treatment, is now making a perfect recovery.

RELATIONSHIP OF DENTAL CORRECTION AND RECOVERY

The fact that a patient's dental condition is made perfect is not necessarily a guarantee of recovery from the disease for which dental work is done. To assure a patient that the elimination of mouth infection will result in systemic recovery is frequently a mistake. Dental infection may be merely coincidental rather than causal, though doubtless the coincidence may aggravate matters. There may be other focal infections coexisting; that from the tonsils in particular. Moreover, intestinal, renal or hepatic autointoxication play etiologic rôles. Other, possibly more remote, sources of localized microbic activity are occasionally found in the sinuses, gallbladder, appendix, kidneys and pelvic organs. Faught[11] suggests that the use of autogenous bacterial vaccines is, in many instances, a great aid in after-treatment.

Most cases of rheumatic heart disease are traceable to badly diseased tonsils. But tonsillectomy does not cure the cardiac condition; the most to be expected is an arrest of further cardiac damage. To expect cure of a thyroid condition in all cases in which an infected dental apparatus is corrected will lead to many disappointments.

A few cases of simple thyroid hypertrophy or hyperplasia or colloid goiter, types of goiter which are of nonneoplastic nature, clear up on the elimination of focal infection. Practically all of these patients recover if the resulting thyroid swelling is likewise treated in a more specific manner by the physician.

Such goiters as are of the nature of tumors (adenomas, cysts and the like) remain even after the removal of infectious foci and most frequently require enucleation (thyroidectomy). Since nearly every thyroid tumor is the result of the neglect of a nontumorous thyroid swelling, the need for thyroidectomy can in nearly every instance be attributed to

delayed or improper attention to the mass in its early stage.

Patients with toxic adenoma are usually benefited by the correction of dental infections to the extent of the reduction or even elimination of the general symptoms of hyperthyroidism. Since these patients eventually require thyroidectomy, the improved general condition reduces to a minimum the risk incident to thyroid surgery.

While I have seen patients with exophthalmic goiter recover without needed dental attention, these recoveries were more tardy and associated with more setbacks than were observed in patients whose teeth had been cared for. In these sufferers, removal of discoverable dental infections markedly expedites the task of the physician in his problem of assisting the patient toward health, and many months of expensive invalidism are saved by timely, expertly applied dental work.

Since goiter patients, as a rule, are advised by their physicians to have dental work done while under general medical treatment for the thyroid condition, it is impossible to estimate the extent of direct causal relationship between an infected mouth and goiter incidence. Hence, dependable statistics on this point are lacking. Some idea of this relationship could be obtained were we to compare the present series of 6,000 cases primarily goitrous with a study of the thyroid gland of 6,000 primarily dental. This would be of interest to both the dental and the medical profession.

WHEN TO EXTRACT DEFECTIVE TEETH

In goiter patients without constitutional disturbances, dental operations need not be delayed. "Good riddance" should be the spirit manifested with respect to infected teeth under these circumstances; the sooner the mouth is clear of them the better.

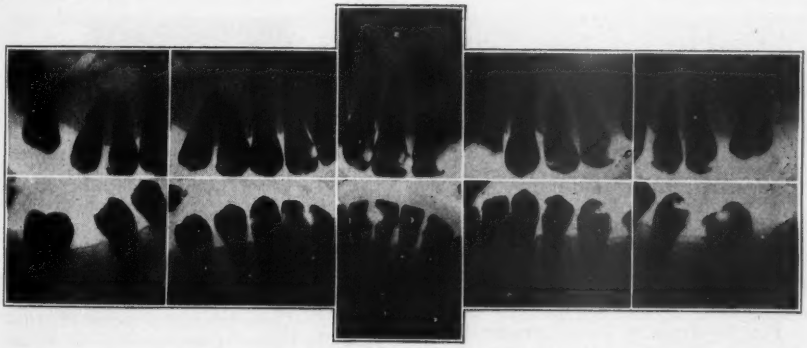

Fig. 4.—Complete roentgen-ray films of all the upper and lower teeth and their adnexa taken before restorative work in the mouth was begun in the patient represented by Figure 3. (Courtesy of Philip B. Label.)

When we are confronted with a goiter patient presenting constitutional evidences of thyroid toxicity, caution must be exercised with respect to the time and extent of dental operation. In cases of toxic adenoma or pure hyperthyroidism (i.e., the superimposition of thyroid

hyperactivity ten or fifteen years after the development of a simple or nontoxic goiter), the patient requires a preparatory period of medical treatment to improve the nervous condition, heart rate, basal metabolic rate and general nutrition, so that the flareup of symptoms almost invariably following the dental procedure will be inconsequential. (Much has been written on the relationship of iodin deficiency to goiter formation. Strictly speaking, the iodin deficiency theory applies almost entirely to the so-called "goiter belts" which, in this country, are situated about the Great Lakes and in the Northwestern states. Many

Fig. 5.—Teeth of patient represented by Figure 3. The one on the left shows probes in the root canal down to the apices; on the right, canals filled just to the apex. Rarefied areas are entirely cleared up. (Courtesy of Philip B. Label.)

observers, among whom are Crotti, of Columbus, Ohio; McCarrison, of the British Public Health Service; Berry, of England, and Bircher, of Switzerland, appear to prove conclusively that the iodin deficiency theory of goiter causation in "goiter belt" districts is untenable, and that other factors, especially unhygienic conditions, improper nutrition, and water-borne micro-organisms are the etiologic factors. At any rate, in this paper, we are discussing not the endemic type of goiter, but thyroid abnormalities discoverable anywhere and everywhere. I might remark that exophthalmic goiter is never endemic.) In the event of need for extensive dental operations, it is safer to do a little at a time, each succeeding procedure awaiting complete recovery from the preceding one. In this manner only will the patient be benefited to a maximum degree, and thyroidectomy, which these patients usually require, be attended with a minimum of risk.

Cases of exophthalmic goiter require extreme caution and may try the soul of all concerned. Strictly speaking, these are

Fig. 6.—Upper left lateral incisor of patient shown in Figure 3; root canal filled. (Courtesy of Philip B. Label.)

not goiter cases. Exophthalmic goiter is a condition in which the entire chain of ductless glands and the autonomic or vegetative nervous system are in a state of imbalance. The thyroid swelling is merely a link in the chain of events constituting the clinical picture. (To those readers who have so frequently heard the terms "hyperthyroidism," "toxic goiter," "thyrotoxicosis," "exophthalmic goiter" and "Graves' disease," I would state that the nomenclature of thyroid conditions with constitutional manifestations is generally confusing. Strictly speaking, the

terms "hyperthyroidism," "toxic goiter," "thyrotoxicosis" and "toxic adenoma" are synonymous, and should indicate a state of thyroid intoxication newly superimposed upon an adenomatous or cystic [tumorous] goiter that had been simple and harmless during a period of ten or fifteen years. The symptoms observed are exactly produced in an individual who has taken an overdose of thyroid tablets. "Exophthalmic goiter," commonly known as "Graves' disease," is not synonymous with the above so-called "toxic goiter." In other words, Graves' disease is not hyperthyroidism, and the two terms should not be used interchangeably. While there are many signs and symptoms in common between hyperthyroidism [toxic adenoma] and exophthalmic goiter [Graves' disease], the points of difference are many.[13] Without going into detail, I might make a general statement by saying that in toxic adenoma it is the neck that makes the body sick, while in Graves' disease it is the body that makes the neck sick. Toxic adenoma is a local condition, due to a harmful thyroid tumor which required enucleation for cure of the individual, while Graves' disease is a constitutional affection with an inconstant *non*tumorous thyroid swelling which later commonly disappears without surgery or expert medical attention to the constitutional causative factors.) Even before the development of the disease, probably since birth, and perhaps through heritage, these patients present evidences of quickened cerebration, lability of pulse and instability of heart rate and a thyroid gland more palpable than the average. Briefly, the predisposition to the disease is usually of congenital origin. It requires but the torch of an exciting cause, usually a psychic trauma, frequently an infectious focus in teeth, tonsils or elsewhere, to bring on the conflagration of the disease and the physiognomy of so-called frozen fright. The eyes bulge, the heart hurries, the body trembles, the emotions run riot, the skin is covered with profuse perspiration. There is complete insomnia, marked loss in weight, and many other features rendering the patient a tragic picture. It is only after these symptoms have existed for some time that the neck undergoes a variable degree of swelling. Often the neck remains normal in size throughout the course of the disease. In the World War, thousands of cases developed at or near the battlefront and were erroneously dubbed "shell-shock," "neurocirculatory asthenia," "effort syndrome," and "early tuberculosis." Automobile accidents, shipwrecks, train collisions, fires, earthquakes, financial panics and other conceivable circumstances attended by fright, shock, worry, grief and anxiety furnish an ample quota of cases. Elsewhere,[14] I have pointed out that such causation, commonly termed psychic trauma, may be elicited in the histories of approximately 85 per cent of subjects of exophthalmic goiter. In most of the remainder, it is reasonable to assume that infectious foci are responsible and, in the majority of these instances, infected teeth are responsible. Of course, there may exist two or more exciting causes to produce the same effect, one probably serving as the primary, the others as contributing causes. Thus, in patients presenting a history of psychic trauma, the coexistence of infectious foci may indicate a multiplicity of exciting causes.

While it is imperative that the body be rid of all infectious foci as soon as

13. Bram, Israel: Toxic Adenoma and Graves' Disease, Northwest Med., 28:210 (May) 1929.

14. Bram, Israel: Psychic Trauma in Pathogenesis of Exophthalmic Goiter, Endocrinology, 11:106-116 (March-April) 1927.

possible, it is dangerous for the dental surgeon precipitously to apply his art in a sufferer from exophthalmic goiter in severe form. I have known fatalities to result from haste. A patient with a pulse rate of 160 per minute, irregular heart, a loss of 40 or 50 pounds in weight, extreme nervousness, a high metabolic rate and emotions in a high pitch of excitement must be very much improved before he is subjected to dental treatment. A few weeks of expert medical attention can usually so improve this patient as to render cautious, tactful dentistry quite safe. The process of caring for the patient's mouth (and establishing oneself in his confidence as well) can then be begun, and as the dentist improves the teeth, he will markedly assist the physician in his task of guiding the patient toward cure.

For in addition to relief from germs and their toxins, there is greater capacity for food intake. In order to recover from exophthalmic goiter, a patient must have a good set of teeth with which to masticate his food, so that the proper nutritional balance will be encouraged and the weight be restored. Improved mastication, insalivation, digestion and assimilation increase vital resistance and immunity processes and expedite recovery. It is therefore obvious that the dentist steps in as the physician's and patient's best friend in efforts at restoration of the sufferer to normal economic and social usefulness.

CHOICE OF ANESTHETIC

In the absence of constitutional symptoms, the choice of anesthetic need not be influenced by the presence of the goiter. Dentist and patient may decide whether a general or local anesthetic should be employed.

If the patient presents toxic adenoma or pure hyperthyroidism, the constitutional symptoms as a rule decide against a local anesthesia, but in favor of a general anesthetic. This will obviate the anticipation of pain and the psychic trauma incident to pain itself, thus minimizing the degree of postoperative reaction.

Patients suffering from exophthalmic goiter should almost invariably be given a general anesthetic when undergoing dental operations. When it is recalled that psychic trauma is, in the majority of cases, the cause of the disease itself, the urgent need for the avoidance of fright and shock is apparent. I have seen many instances of acute exacerbation and relapse and an occasional fatality from untimely dental operations in these patients and from improper choice of anesthesia with resultant tremendous shock to the system. Also, it must be remembered that, in these patients, it is best to do a little at a time in order that the bodily reactions may be noted and complete recovery from each procedure occur before the next is attempted.

Another precaution must here be mentioned with respect to dental operations in cases of exophthalmic goiter, and that is in the matter of bleeding. Because of a deficiency of blood calcium, these individuals may be looked on as pseudohemophiliacs, and unless the necessary prophylactics are employed, serious postoperative hemorrhage may occur. I usually advise a preparatory course of calcium therapy or the use of a serum which consists of the active principle of the parathyroid glands, a substance which markedly increases the blood calcium.

SUMMARY

1. Of 6,000 goiter cases herein discussed with relation to dental infections, 2,273, or 37.8 per cent, were apparently normal from a dental point of view, while the remainder, 2,926, or 48.7 per

cent, presented varying degrees of need for dental care. There were 801, or 13.3 per cent, of patients with devitalized teeth only.

2. It is impossible to determine the causal relationship between dental infections and thyroid abnormalities in our present state of knowledge. While, in a large percentage of cases, mouth infection may be purely coincidental in thyroid disease, it is felt that, in a considerable number of patients, focal infections in teeth and elsewhere must be etiologically related. At all events, it is reasonable to assume that dental infections, even if primarily coincidental, play a contributory rôle in the production and establishment of thyroid disease.

3. To expect cure of a thyroid condition by the correction of dental infection alone usually leads to disappointment. It is essential that a physician capable of handling thyroid conditions cooperate with the dental surgeon in the interests of recovery of the individual as a whole.

4. In cases of simple or nontoxic goiter (i.e., thyroid enlargements without constitutional manifestations), no unusual precautions need be taken in the performance of dental operations. In subjects of toxic adenoma and especially exophthalmic goiter, it is in the interests of safety of the patient and recovery from the disease that the foregoing comments on the time and extent of the performance of dental work be observed, with caution against undue hemorrhage. General anesthesia is ordinarily preferable in toxic cases.

5. It is suggested that a series of several thousand primarily dental cases be studied relative to the condition of the thyroid gland in order that a comparison can be made with a similar series of primarily thyroid patients. This will assist in determining the extent of direct causal relationship between infection of the dental apparatus and thyroid abnormality.

6. It is urged that all mouth infections discovered in goiter patients be eliminated as soon as is consistent with the best interests of the patient, no matter what demonstrable etiologic relationships are present. This will greatly assist the physician's efforts at cure of the thyroid abnormality.

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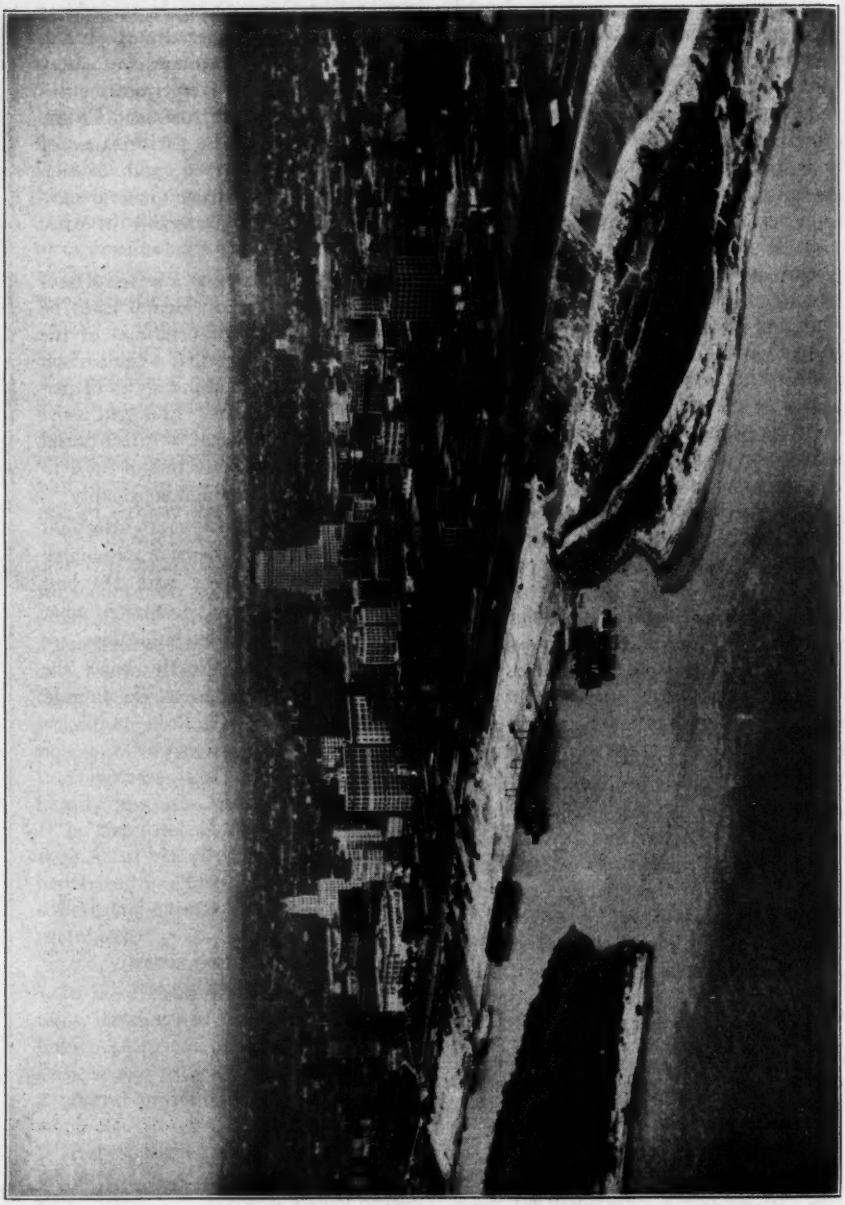

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Editorials

THE MEMPHIS MEETING

In a little more than two months from the date of this issue, the American Dental Association will convene for its 1931 Session. Already the Local Committee has the situation well in hand, and with the energy characteristic of this splendid group of men, we may look forward with confidence to the stage setting for the next meeting. The fact should be emphasized that at each annual session the chief burden of preparation falls on the Local Committee. The rank and file of our membership have not the least conception of the manifold duties that devolve on the Committee from the very day of their appointment till the final adjournment at the close of the meeting. The only men who really visualize this are the ones who have served on similar committees at previous meetings, and the marvel is that year after year different groups of men may be found who bid so loyally for the privilege of holding the meeting in their favorite city. The only reason is that there is that splendid thing in the hearts of men called local pride whereby the

Seventy-Third Annual Session, American Dental Association, Memphis, Tenn., Oct. 12-17, 1931

citizens of a favorite city are willing to sacrifice individual comfort for the public good.

For the coming session, we have the assurance of our officers that, as far as the Local Committee is concerned, everything humanly possible is being done to make perfect the arrangements for the 1931 meeting, and the entire organization is under deep obligation for the work already done by that body.

The program for the general sessions and the various section meetings is being brought to a favorable issue. The reports from the section officers would indicate that unusual preparation is being made for the scientific sessions, and no matter in what department of our work a member may be interested, he will be assured of ample entertainment and instruction.

Our President, Robert Todd Oliver, has been very active during the past year in visiting our state and district organizations, and has through that medium made contact with very many of the leaders of the profession, thus eliciting much interest in the meeting. And in this connection, here is another service the exactions of which can scarcely be realized by the membership as a whole. The President is called on to devote much of his time and energy to the welfare of the Association at the expense of his personal interests, and he does it willingly and gladly as his contribution to the upbuilding of organized dentistry. Our Association has been fortunate in the character of men whom it has selected to head the organization, and we bespeak for our present incumbent the hearty support of every loyal member of the Association.

The general meetings of the Memphis Session promise to be more than ordinarily entertaining. This part of the program is largely under the direction of the President and the Secretary, and we can vouch for the fact that during the present administration these men have devoted their utmost energy toward the problem of securing the best available talent. Ever since the Denver meeting, our very efficient secretary, Dr. Harry B. Pinney, has been canvassing the situation for the most acceptable entertainment, and it is safe to promise that when the general meetings convene, there will be provided for our members and invited guests a program

that will prove a landmark in the progress of organized dentistry.

The clinical program is shaping up in acceptable order, and this most practical of all our activities promises to maintain the high order of excellence that has always characterized it.

The entertainment of our members in the way of social events and sports is never neglected in our program, and with the cordial hospitality of the proverbial Sunny South, there is every assurance that the meeting at Memphis will prove one of the most profitable and pleasant of all that have been held. Plan to go to Memphis and accept the hospitality that is assured by the fulfilment of the program already provided.

A POSSIBLE EXPLANATION OF MOTTLED ENAMEL

For years, the subject of mottled enamel has concerned the dental profession, and, from time to time, articles have appeared in our literature dealing with this most distressing malady. Frederick S. McKay has probably devoted as much time as anyone to its study. In 1909, the late G. V. Black went to Colorado to investigate the subject in conjunction with Dr. McKay, and ever since that time, the latter, at various intervals, has written on the subject. Others have occasionally referred to the question in our literature, but, till quite recently, no one has offered a specific solution of the difficulty. From the very first, it was suspected that the water supply was accountable for the trouble, but no one, as far as we know, had designated the particular element in the water that did the damage.

It has remained for an industrial chemist, H. V. Churchill, of the Aluminum Company of America, to suggest a possible explanation. In a more or less detailed statement to the Associated Press, Mr. Churchill outlined his ideas as first publicly expressed at a session of the American Chemical Society, March 21, 1931, in which he attributed the phenomenon of mottled enamel to the presence of fluorin in the water supply, and he goes on to study the manifestations and percentages of fluorin in the water of different localities.

While the Associated Press article quite naturally does not treat the subject from the point of view of the dental research worker, and while further investigation will be required to establish definitely the causal relationship between mottled enamel and the influence of fluorin, at least we can say that this theory offers us the first plausible explanation that we have had as to the specific factor in this disfiguring affliction. Interest in the subject is spreading as is evident in the two final paragraphs of the Associated Press article, which are as follows:

> Subsequent to this announcement, Dr. Margaret Cammack Smith of the University of Arizona has reported her work on the possible correlation of fluorine in drinking water with the mottled enamel defect as it has occurred in Arizona. Intense interest in Churchill's discovery has been evidenced by authorities in public health work, dental research and municipal water treatment and analysis.
>
> The revelation that fluorine in drinking water is responsible for the permanent disfigurement of thousands of children and adults imposes a new duty on those who are responsible for the quality of water supplies. Hitherto, processes of chlorination and clarification have been deemed sufficient in water purification, but now an additional control is necessary. Chlorination solved the problem of typhoid. The control of fluorine concentration so that it never exceeds one part per million will solve this age old problem of mottled enamel.

PAY YOUR DEBTS

Failure to keep an obligation is one of the besetting sins of humanity. If you owe a man money, pay it. If you owe him your allegiance, see that he has it. If you owe him a favor, grant it. If you have given him a promise, see that it is kept. If by any chance you have been inveigled into promising a difficult or unreasonable thing, never mind, keep your promise—it may make you more careful about promising again.

To honor an obligation is one of the prime essentials to the maintenance of character. To hedge on an obligation is to begin a moral disintegration that may prove fundamental. To gain the reputation of always paying your debts is one of the greatest assets of economic or professional life. No other one thing will so surely anchor you in the public esteem as the reputation of invariably honoring your obligation, or paying your debts.

BUREAU OF DENTAL HEALTH EDUCATION

INFLUENCE OF THE ENDOCRINE GLANDS ON ORAL HEALTH*

By FLOYDE EDDY HOGEBOOM, D.D.S., Los Angeles, Calif.

THE history of medicine shows a gradual growth of public health activities, until now we have a great division of interest which is collectively known as social medicine.

Social medicine is of necessity a mass movement. Dentistry has quite rapidly taken over a section of this battlefront and is pleased to label it "preventive dentistry." Public health centers have been opened in which dental clinics are included. Public educational systems have included oral hygiene in their teachings. We are so accustomed to doing things *en masse* in this country that frequently we lose sight of the individual.

As I see it, preventive dentistry in its final analysis is diagnosing the patient's needs, and then of the many roads that he might follow to reach the goal, selecting the one best suited to his needs. In many cases, it will be found that the existent difficulties may be laid to diet.

Deficient diet, unbalanced diet and all that it implies, is being blamed for dental caries and pyorrhea. In our enthusiasm, we prescribe wholesale dietaries, disregarding the fact that some foods are nutriment for one person and toxin for another. So, in the final analysis, the individual needs must be the end to be striven for. Successful preventive dentistry is an individual study.

In the study of people, classification is made in innumerable ways, depending on the particular subject the investigator is interested in. From a physical point of view, people have certain constitutional make-ups. It is necessary for the diagnostician to recognize these types and in a general way, foretell the pitfalls along that patient's highway. He must chart detours around these danger points. Unfortunately, he cannot drive the machine: the patient must direct his own body. He must know what foods most influence metabolism. He must know in a general way the body motors and how they run, and, finally, he must have some understanding of the governors and regulators, the endocrine glands, that keep the body in an even tenor day in and day out.

There are certain periods of life known as the endocrine phases of life; that is, the periods of growth, puberty, menstruation, pregnancy, lactation and the menopause. In all of these phases, dentistry is very much interested. For instance, during periods of growth, the teeth may be normal in form and occlusion, or they may not. During puberty, pregnancy,

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Second Annual Session of the American Dental Association, Denver, Colo., July 24, 1930.

lactation and the menopause, caries or periodontoclasia may become rampant.

People have been classified as hyperthyroid, hypothyroid, hyperpituitary, hypopituitary, hypoadrenal, hyperadrenal and hyperthymic. The dominant note of the constitutional make-up classifies each person. Each class has certain pitfalls to avoid, and the competent diagnostician hangs danger signals at these points in the road.

In studying the dental symptoms of these types and particularly the pathologic endocrine types, I have been struck with the vagueness of the literature on the subject. A sentence or two injected in a book is supposed to outline the dental symptoms. These books are all written by medical men, and conseqently the dental symptoms are usually not evaluated from the dental point of view. This is a rich field of investigation for dentistry, and its study may help to solve the caries problem. I believe that dietary deficiencies are probably at the bottom of dental caries, but I have studied a number of endocrine cases in which the teeth were beautiful, free from caries, and with occlusion excellent; and these children eat as 99 per cent of the children in this country eat. There seems to be an endocrine factor in them that pre-

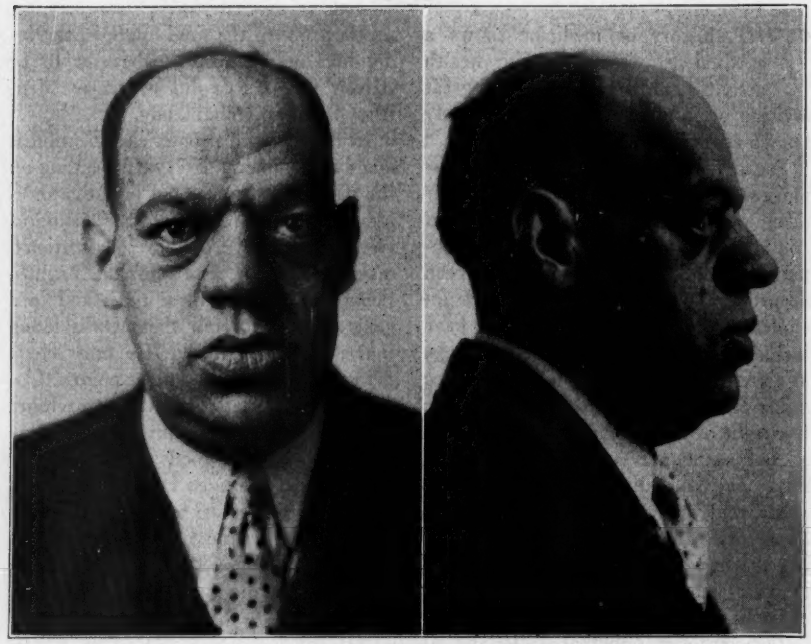

Fig. 1.—Typical case of acromegaly in adult. The face is hexagonal, the nose large and bulbous; the lips are thick, and the maxillary bones overdeveloped.

vents caries and promotes excellent occlusal conditions in spite of unbalanced diets.

I am not advocating treatment of these cases by the dentist, but I am interested in the early diagnosis of these conditions. The dentist will see many children whom the physician does not, and he should recognize some of the dental symptoms. Cooperation between physician and dentist in the study of endocrine conditions will most certainly aid in establishing better oral health conditions. The dentist is charged with the responsibility of correcting and preventing oral disease, but he cannot fulfil his

Fig. 2.—Hand of patient. Tufting is evident at the ends of the bones.

Fig. 3.—Hand of normal person.

Fig. 4.—Hypercementosis on roots of teeth, particularly posterior teeth.

function until he better understands diagnosis of all the conditions bearing on his problem.

In our childhood, we were all told the Bible stories of David and Goliath; how Goliath, the mighty giant, stood out on the hill clad in armor and dared anyone to fight him. Then little David destroyed him with his sling-shot. A beautiful story, but in the light of science, probably Goliath was one of those unfortunate individuals whose tremendous height was due to some upset in his glandular structures. Probably he had the body of a giant, but the mentality of a child; and so when a normal boy came along, Goliath went down.

Fig. 5.—Cast of teeth shown in Figure 4. There is an extreme prognathism, so that the patient cannot make the upper and lower anterior teeth meet. The extreme separation is caused by the overgrowth of bone.

All through the ages, certain physical peculiarities of development have made dwarfs or giants, the fat or thin, the brilliant or dull, the normal or abnormal. Around these abnormal conditions, stories and myths have grown up of dwarfs, goblins, giants and witches. Only in recent years have medical men been able to find the cause of these conditions. There is a vast literature on endocrinology, but the dental phase has been neglected or only vaguely correlated with other physical signs.

There are certain dental aspects of this matter that I wish to outline to you. Last year, I outlined to you the fundamental principles underlying the causation of these conditions and some of the diagnostic signs which a dentist should recognize.[1]

Fig. 6.—Occlusal view of cast shown in Figure 5.

1. Hogeboom, F. E.: Serving the Child in Dentistry, J. A. D. A., 17:920 (May) 1930.

PITUITARY CASES

I will show two types of endocrine dystrophy, cases first diagnosed by Norman K. Nixon of the Children's Hospital Staff of Los Angeles, and the dental conditions afterwards evaluated.

ACROMEGALY

The definition given by Peter Bassoe for acromegaly is as follows: "According to our modern conception, acromegaly is a morbid state caused by glandular hyperplasia and functional overactivity of the hypophysis, resulting in (a) primary glandular symptoms consisting mainly of abnormal growth of the soft and bony parts of the 'end segment'—tongue, jaw, hands and feet; (b) secondary glandular symptoms from associated and subordinate disturbances of other endocrine glands, notably of the gonads, the adrenals and the thyroid; (c) local mechanical pressure symptoms caused by the hypophysial tumor and affecting chiefly the optic chiasma and nerves; (d) secondary and general brain symptoms dependent on increased intracranial pressure."

Fig. 7.—Boy, aged 9, with developing pituitary tumor.

Figure 1 shows a typical case of acromegaly in an adult. The face is hexagonal, the nose large and bulbous, the lips are thick, and the maxillary bones overdeveloped.

Figure 2 is a roentgenogram of the hand of the patient. Tufting is evident at the ends of the bones.

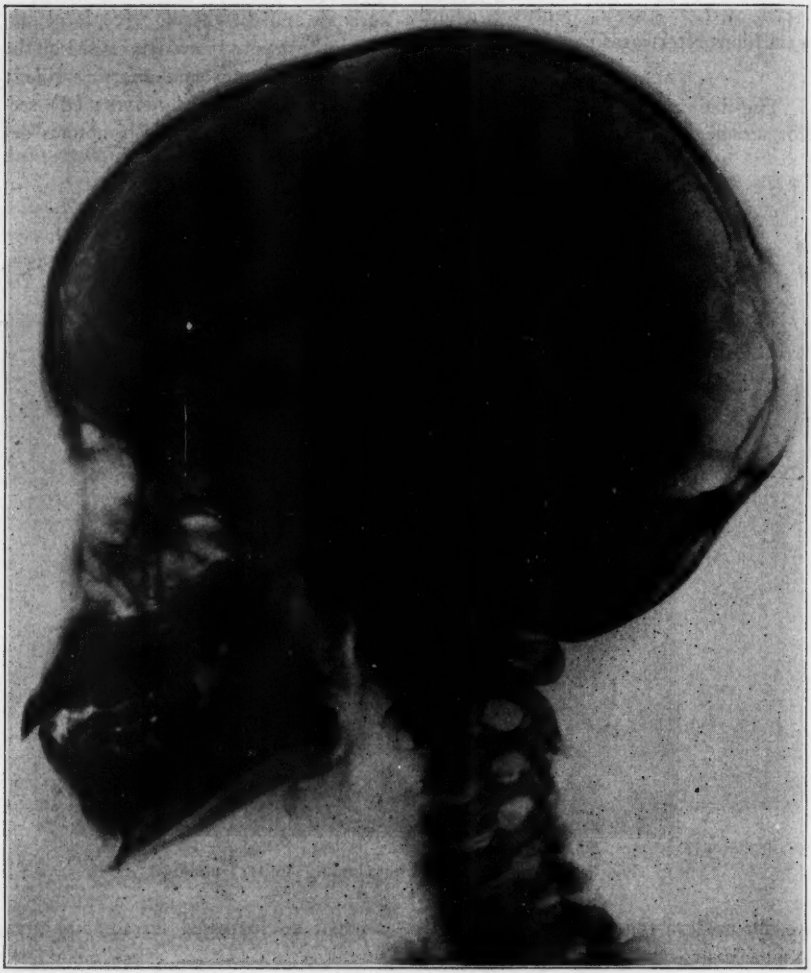

Fig. 8.—Sella turcica. There is slight enlargement.

Figure 3 shows the hand of a normal person.

Figure 4 shows the hypercementosis on the roots of the teeth, particularly the posterior teeth. Figure 5 shows a cast of these teeth. There is an extreme prognathism, so that the patient cannot make the upper and lower anterior teeth meet. This condition has been coming on for

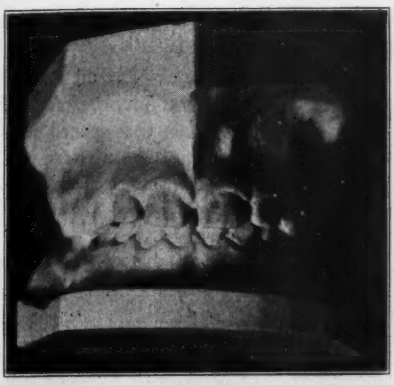

Fig. 9.—Casts of mouth with spaced central incisors.

Fig. 11.—Model showing spaced teeth. The brother, mother and aunt of the patient have spacing anteriorly.

Fig. 10.—Occlusal view of cast shown in Figure 9.

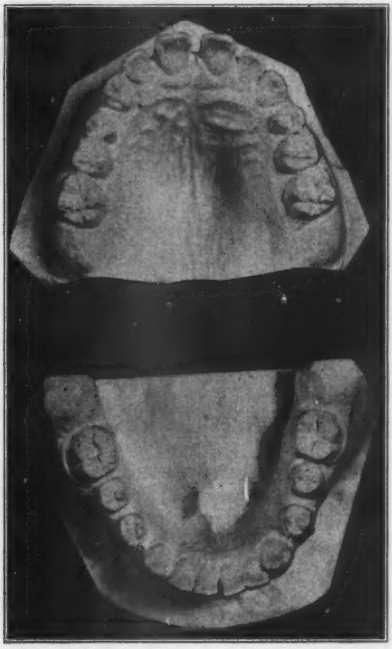

Fig. 12.—Occlusal view of cast shown in Figure 11.

fifteen years, and he says that he can remember the time when he could bite a thread. The extreme separation is caused by the overgrowth of bone. Figure 6 shows an occlusal view.

Figure 7 shows a boy, aged 9, with a developing pituitary tumor. His parents first noticed something wrong when he had recurring headaches every afternoon about 4 o'clock. He was referred to the clinic at the Los Angeles Children's Hospital and there diagnosis was made by Dr. N. K. Nixón. Figure 8 is a roentgenogram of the sella turcica. There is slight enlargement.

Figure 9 shows the casts of the mouth with the spaced central incisors. Attention is called to the fact that spaced central incisors do not mean that there is a pituitary tumor, but it does mean that other than local symptoms are to be anticipated. Figure 10 is an occlusal view.

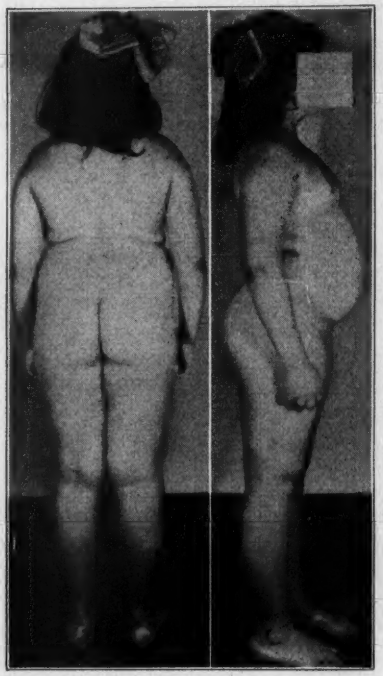

Fig. 13. — Dystrophia adiposogenitalis (Froehlich's syndrome). There is a girdle of fat in the pubic regions, and there are also fat pads in the middle of the back.

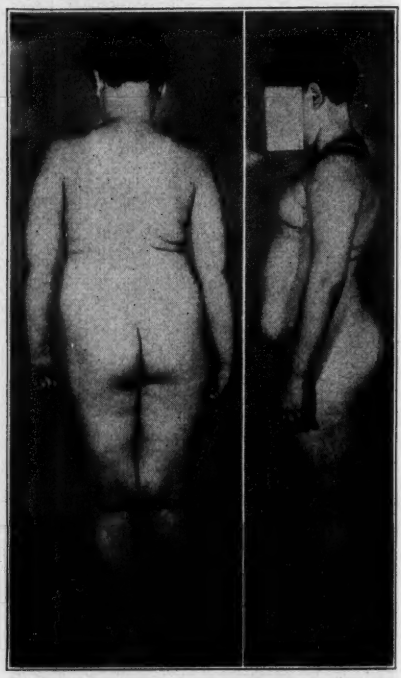

Fig. 14. — Dystrophia adiposogenitalis (Froehlich's syndrome). In the males, the underdevelopment of the genitalia is easily observed. There is a girdle of fat in the pubic regions, and there are also fat pads in the middle of the back.

Figure 11 is another model showing spaced teeth. This condition seems to be hereditary since brother, mother and

aunt have spacing anteriorly. This shows how futile it is to draw conclusions without a complete examination. Figure 12 is an occlusal view.

DYSTROPHIA ADIPOSOGENITALIS (FROEHLICH'S SYNDROME, OR HYPOPITUITARISM

According to Harvey G. Beck, dystrophia adiposogenitalis is "a condition due to underfunction of the hypophysis characterized by obesity, genital hypoplasia and faulty skeletal development; associated with nervous and mental symptoms which are either the direct result of deficient secretions or dependent upon local or general intracranial pressure."

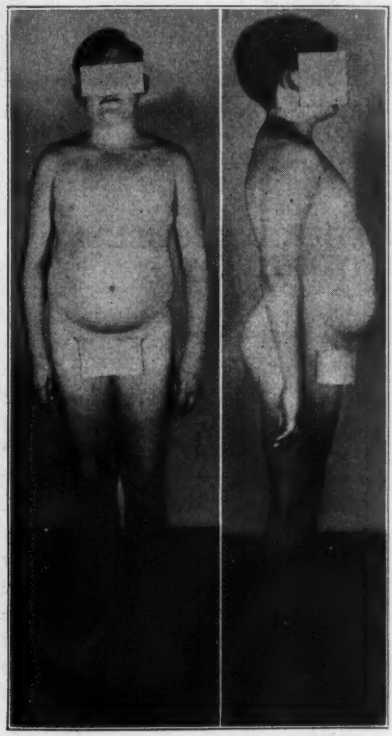

Fig. 15 — Dystrophia adiposogenitalis (Froehlich's syndrome). In the males, the underdevelopment of the genitalia is easily observed. There is a girdle of fat in the pubic regions, and there are also fat pads in the middle of the back.

Figures 13-15 show three cases illustrative of this type of hypopituitary function. Obesity is evident. In the males, the underdevelopment of the genitalia is easily observed. There is a girdle of fat in the pubic regions, also fat pads in the middle of the back.

Figure 16 shows five casts taken from five hypopituitary cases. The three children shown in Figures 13, 14 and 15 are represented in this group. They have arches that are free from malocclusion, and three of them have no caries. One has caries due to starvation, without the proper substitution of calcium and phosphorus. I did not see the patient before treatment began, but I feel sure that there was no caries present before treatment began. Investigation should be made to discover why these children who are not normal physically have beautifully shaped arches and practically no caries. There is a condition here which may assist in solving the problem of malocclusion and caries.

Successful prevention of dental disorders starts not with the child, but with the potential mother. I say "potential" because so many times unsuspected physical conditions exist that make it difficult for a child to be well-born. This problem of preventive dentistry has so many ramifications that it is no wonder diversity of opinion exists between research workers. A plea for an intensive study of everything pertaining to children's dentistry will open the pathway more quickly to successful prevention of oral disease.

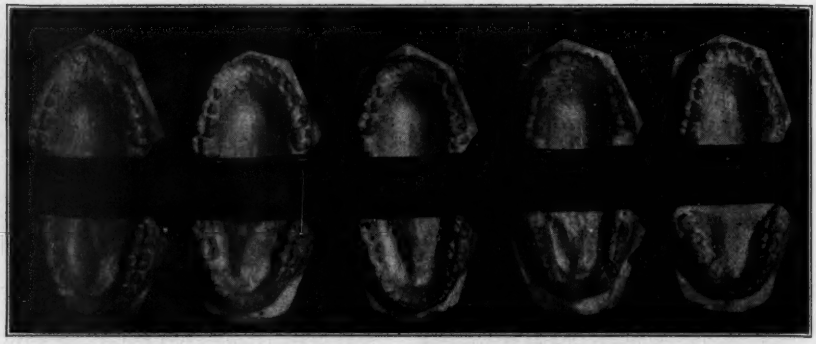

Fig. 16.—Casts taken from five hypopituitary cases. The three children shown in Figures 13, 14 and 15 are represented in the group. They have arches that are free from malocclusion, and three of them have no caries.

THE MEDICAL CLINIC IN THE CURRICULUM OF THE DENTAL HYGIENIST

By LOUIS I. SKIRBALL,† M.D., Boston, Mass.

THOUGH the trained hygienist is a comparatively recent arrival in the dental profession, her presence there is no longer a mere matter of experiment. The dental hygienist has become an established institution, indispensable in the modern practice of dentistry. Daily, her field of activity is widening, her opportunities for service becoming more varied. In the early days, the function of the dental hygienist was to teach school children the proper prophylactic care of the mouth and teeth. Today, she must be a versatile member of the dental profession. She may be called on to act as office assistant, anesthetist, laboratory technician, school hygienist or public health worker; and she must be ready to undertake any, or all, of these tasks.

So versatile a rôle requires in preparation a varied and carefully selected curriculum of studies. Naturally, major emphasis must be laid on the practice and theory of dentistry. This must be the keystone. But because the sphere of the dental hygienist extends beyond the field of practicing dentistry and its laboratory work, the ideal curriculum must be as broad and as varied as is the field of activity that the graduate hygienist must enter.

The courses of study in the various training schools for dental hygienists are not well standardized. There is still considerable experimentation directed

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toward the perfect curriculum. As the range of the hygienist broadens, so too must her course of studies. To meet certain of the hygienist's needs, the Forsyth Dental Infirmary has, in recent years, included medical clinic teaching as a part of the curriculum. At first an experiment, "supervised observation" in the medical clinic has become an established factor in the training of the hygienist, an integral part of her course of studies.

The pediatric clinic, which was established several years ago, is now a classroom for the hygienist. It consistently follows the policy that true dental hygiene means attention to all conditions affecting the teeth.

This medical clinic, a clinic of "dental pediatrics," is a component part of the infirmary routine. The clinic was established in recognition of the interrelation of good teeth and general health. The patients for this clinic are chosen from the rank and file of children who are brought to the infirmary for dental inspection, advice or treatment, and who appear to have dental defects or maladjustments that seriously interfere with general good health. These patients represent every age, from the preschool child through adolescence, every racial group in Boston, every social and economic class.

The clinic aims to readjust the physical and mental lives of its young patients, to teach proper habits of hygiene, to prescribe necessary medical readjustments. Whenever it is advisable, the patient is referred to the infirmary's excellent food and habit clinic, where he or she is instructed as to proper diet and health habits. The pediatric clinic works hand in hand with the infirmary's dental clinics, in the expectation that an improved general physical condition will react favorably on the development and preservation of sound teeth.

In such a clinic, there is much for the dental hygienist to learn. Elsewhere, she is taught all she need know of oral health and disease in children. In this pediatric clinic, she is given an opportunity to study the child as a whole, his general physical and mental condition, his adaptation to his environment.

She learns first, of course, how the so-called normal or average child looks and acts. She learns to note his good color, his bright eyes, his lustrous hair, his erect posture, his firm flesh and well-developed muscles, his sound teeth. She notices that such a child is happy, alert and full of life. She ascertains that his appetite is good, his bowels are regular, his sleep is sound.

So, too, she learns to notice and evaluate obvious deviations from the normal. She learns the signs of malnutrition in various degrees. She notes that the child may be very thin, or very fat and flabby. She sees that his skin may be sallow, pasty or pale, or he may look delicate. He may have blue circles under his eyes, his tongue may be coated, his mouth may be open because of obstruction by enlarged tonsils or by adenoids. Lack of muscle tone may cause him to have poor posture and round shoulders. He may be nervous, fidgety and backward mentally. His teeth may be carious, missing or poorly developed.

Then, too, she learns of the influence on the child's health of certain important extraneous factors: the child's family history, the child's own previous illnesses, his environment, his economic condition. She learns to recognize the importance of the child's social life in a consideration of his physical condition.

The method by which the hygienist is taught in the pediatric clinic is a very

simple one. She is an integral part of the clinic, taking active part in the work. She meets the incoming patient. She weighs and measures him and makes a comparison between the figures obtained and those on the standard charts of average weights and heights. She asks questions about his family history, nativity and previous diseases. She jots down a brief social history of her patient.

The hygienist then takes her patient into the clinic room. Here, she acts as nurse. The head of the medical clinic makes his observations audibly, explaining to the hygienist each step in his diagnosis. The hygienist is encouraged to make suggestions and to ask any questions that may have a bearing on the case.

The clinic head gives the child a thorough physical examination. He notes the hygienist's records, and, if necessary, gets a more extended medical history from the mother of the child. He explains the relation of any congenital or acquired disability to the present physical or mental condition of the child. Thus, the paralysis of a child's entire left side may be traced to a difficult birth requiring high forceps. A bowlegged child, with a broad forehead and irregular teeth, is found to have been fed exclusively on condensed or boiled milk and prepared foods, without the addition of fresh fruit and vegetables or cod liver oil to make up for the deficiency in vitamins. A nervous, fidgety child, whose condition suggests a possibility of chorea, is found to have had scarlet fever with a heart complication, and the hygienist learns to associate the nervousness with the sequelae of this disease. These physical conditions are noted, and an effort is made to correlate them with the history of the child's family, and with the child's present environment and social and economic status. After weighing all the available material, and explaining its significance to the hygienist, the clinic head makes his diagnosis and prescribes treatment.

Of course, to an incoming class of hygienists, explanations must be elaborate and all-inclusive. Later, as the hygienist learns from observation and experience, briefer explanations suffice; and eventually she can follow the examination intelligently, and a simple physical diagnosis requires little more effort on her part than the diagnosis of a simple dental condition.

As the children return for after-treatment, the hygienist is able to observe the progress that her patient has made. She again aids in the examination of the patient, and compares the findings with the records of the previous examinations. Thus, she has an opportunity to "follow up" a case over a certain period of time, noting the results of treatment.

No—we are not trying to make physicians of our hygienists; but we are trying to give them the equipment they need to fit the peculiar demands of their profession. For the hygienist today is a pioneer. She is bringing a mountain to Mahomet. In regions where dentistry is practically unknown, she must travel, a missionary equipped with a working knowledge of her profession. She must have more than a mere knowledge of oral conditions; for, in these unexplored fields, she must be cognizant of the sociologic and economic conditions in which her patients live, and must meet them. She must understand, at least in general terms, the physical condition of her patients and pupils. And keeping fully in mind the physical condition and the background of the children before her, she must be able to teach them the principles of oral hygiene, both prophylactic and reconstructive. This can best be

accomplished by including in the curriculum for the education of the dental hygienist the opportunity to attend a medical clinic where social and medical observations become associated with the observation of dental conditions.

ORGANIZED DENTISTRY*

By ROBERT WHITEHILL, D.D.S.

IN almost every family circle may be found someone who would much prefer music of any type to talking, no matter what the topic. It is easy to imagine these persons urging the family radio operator to tune in on another station, especially when so dull a topic as "Organized Dentistry" is announced.

The first reaction of these persons is probably to say, "What do I care about dentistry? I know too much about it already." Dentists are so accustomed to these facetious remarks about their calling that they have had a sense of humor forced on them, even in cases where it did not always exist.

Perhaps that sense of humor is justified by the picture in their minds of what this world would be like were all the knowledge of dental science and dental art to be suddenly wiped out. Very likely the older listeners, and possibly a few of the younger ones, have heard of a place "where is weeping and gnashing of teeth." Well! It would be like that. But that isn't all. Not only would the wails and cries of fretful, suffering children be heard in the land, but also parents who are now noted for their calmness and poise would find difficulty in setting a good example for the little ones.

Then, too, there would be no pretty grandmothers. There is more to dentistry than merely preventing pain. Picture our Hollywood favorites without the pleasing contour of feature that are in reality built over a foundation framework of perfect teeth. No lovely lashes or lip-stick art would atone for a nose and chin that nearly met.

But, of course, one may say, "What of it? The world could do its work, if no one was beautiful, and if people did have a little pain now and then." Very likely it could—after a fashion—but in this land, where efficiency is the great god, it wouldn't be considered good business. The hordes of rheumatic cripples, hobbling about, would certainly slow up the wheels of industry.

Malnutrition, too, would put in its claims, and our vigorous younger generation, instead of growing taller, and stronger than the parental stock, as now seems to be the case, would be smaller, more anemic, and an easier prey to disease. These suggestions, by way of introduction, may seem whimsical. They are offered merely to indicate that dentistry, once a luxury, or even nonexistent, has a very important place in modern life. Once having known it, and known its worth, we could no more get along without it than we could without steam or electricity.

*Broadcast over WEEI under the auspices of the New England Dental Society.

Perhaps that statement may be taken for granted, but why should the public be interested in organized dentistry or in dental organizations? Chiefly because, without such organizing, this great public health service, as we know it, would not exist.

Ninety years ago in the city of Baltimore was founded the Baltimore College of Dental Surgery. This, the first successful attempt at organization of the new profession, was of tremendous importance. Until that time, as in the early history of medicine and of law, the only means of acquiring specialized education was by apprenticeship. Skilful craftsmen, in many periods, had made attempts to meet what was recognized as a crying need, but as far as affecting the great masses of humanity, their efforts were as but a drop in a bucket.

Our own colonial hero, Paul Revere, found time along with his brilliant work in gold, silver and the casting of church bells, to try his hand at dentistry, and it is to be presumed that many others regarded what they did in that line as but one of many accomplishments.

It is reasonable to believe that the amount of good achieved could have benefited but a small percentage of the population, even in the early days of the past century, when pioneer dentists had acquired considerable skill, as they were too few in number, and the need was so vast.

With the founding of the dental schools in the middle of the last century, the spirit of earnestness and desire to study, which has always characterized this young profession, led to the establishing of dental societies, and real organization made possible an attack on problems which individuals could not meet.

Small groups of dentists arranged for evening meetings in the homes or offices of some of their number, where problems and methods were discussed, and, from such small beginnings, originated many of the societies which are large and important today.

About this time, there was much controversy in regard to the position of dentistry in relation to medicine. Many of the earlier practitioners and holders of degrees from the new dental schools were also holders of degrees in medicine, and there was a good deal of difference of opinion as to where the two professions should part company, if at all.

This topic is still a live one. The Encyclopedia Brittanica defines dentistry as a special department of medicine, and the young profession is deeply indebted to the faculties of medical schools throughout the world for their cooperation in providing fundamental education.

With the beginning of organization came a new spirit of liberality and a desire to be helpful to brother practitioners. What a contrast to the period when secrecy and jealousy were the rule!

A profession is truly great only as it endeavors to lift all of its members to the level of its most advanced representatives. This is the aim of organized dentistry, and if the spirit of its leaders counts for anything, it is doing a good job.

The code of ethics, on which dental societies insist, makes certain that each member shall deal justly with the public, and with his professional brothers. The fact of the matter is that the man who is active in the societies, and imbued with the idealism which prevails in their atmosphere, has an instinctive regard for the welfare of the public, and for the good name of his profession.

One of the greatest advantages of dental organizations is that they have made their members work. This doesn't mean that the ordinary practicing dentist needed to work harder than he did already.

There are few jobs more trying or more exhausting than his. But the societies have been a stimulus to investigation and research. Whenever a man is called on to write a paper or to give a clinic or a teaching course, the work of preparation has usually made him a better man, and the result of his labor has redounded to the benefit of the profession at large, and the welfare of the public.

And the public benefits very quickly, too, for the publication of original papers, and the results of research, in the dental journals makes such new knowledge quickly available to the entire profession.

Thus has been built up a large dental literature, for which we are indebted to organization. The dentist who is profiting by this work of the societies, and who is doing nothing to contribute to their support, is not doing his full duty.

Our old friend the Encyclopedia Brittannica tells us that "The progress of dentistry since 1900 has been more rapid and more radical than in any previous period. Change of interest and development has been little short of revolutionary." To sum up its findings is to learn that this change of interest is chiefly a result of the emphasis now placed by the profession upon the prevention of disease.

This it attributes to the accumulation of scientific knowledge through investigation and study. We may thank organization for this. There was a time when teeth were regarded as just teeth. Today, their influence on general bodily health is recognized by profession and public alike. In fact, the dentist who is not keeping up his connections with dental organizations, and who is not keeping up with the literature of the profession, is likely to find the public one or two jumps ahead of him.

The "change of interest" referred to a moment ago has made the dental world very complex, for even the most enthusiastic and studious member of the profession.

A generation ago the emphasis was largely on skill, and the operator who knew that his well trained fingers were turning out work of high mehanical excellence could feel quite complacent and self-satisfied. Today, this mechanical excellence is not enough, and contemplation of the things that a dentist must *know*, as well as the things he must *do*, is enough to give him a headache. It is here that organization steps in to help him. No one man, however clever, can know it all. Collective knowledge and collective experience are enormous, and the man who sets aside the time for attending meetings discovers that the knowledge and the experience of the leaders in the various specialties of the profession are all at his disposal.

Much of the work of the past in attacking the problem of dental disease and of mouth health was like trying to sweep the ocean back with a broom, or in the manner of locking the barn after the horse was stolen. In fact, the problem seemed so vast, and so hopeless as to be very discouraging, but there is a new feeling of optimism in the profession since "prevention" has become the watchword.

The younger generation is already showing the benefit of early care and systematic attention. Much of this benefit can be traced to the educational work of the organization. Results most gratifying have come from the periodic examination of the teeth of children in the public schools. The children themselves have eagerly absorbed the teaching in regard to mouth hygiene. The pupils of one room are in competition with those of other grades to see which shall have the honor of first being 100 per cent in dental health.

This is in such striking contrast to conditions existing a generation ago that a prophet of that earlier era would have said, "It just couldn't be so."

Time will not permit a cataloging of the various agencies that are making it possible for this work to be done. The magnificent gifts which have been made for dental infirmaries have probably benefited the public health far more than the donors themselves could have anticipated. There is still need for all the help that public spirited citizens can give along these lines. The battle against dental disease is not yet won, and is not likely to be won for a long time, but there is hope for the rising generation.

Some wise man once said that the aim of a profession should be to eliminate the need for its services. If that is true, we must conclude that true professional spirit is being shown by organized dentistry.

THE TRUTH ABOUT YOUR SERVING MEN*

By FRED G. ROLLINS, D.D.S., Boston, Mass.

IT means something today to go through life in the possession of one's own teeth. People who do so are in the minority. Guard your serving men, one of Nature's most precious gifts and you will be rewarded during your advanced years. Neglect them and dire results will follow.

The adult mouth normally contains thirty-two teeth. Modern science and research have disclosed the fact that the teeth are no longer to be regarded as so many ivory pegs set in the mouth with an isolated and individual function; but they are now being considered by the dental and allied professions, as well as the laity in general, as an extremely important part of the body, subject to the same chemical laws as other members of the human system, having a vitality of their own and being an integral unit of the general system that constitutes the body. A disturbance or disease of one member of the body exerts its influence and ill-effects elsewhere in the system by the poisonous secretion, and failure of that member to do its part to maintain the efficiency of the human machine.

Decay of the teeth is a disease. It has been said that the mouth is that part of the body where all sorts of ills enter or develop. A better incubator for bacteria could hardly be designed, as the mouth has warmth and moisture to promote the growth of germs and food for them. A well-known authority, some years ago, wrote, "There is no single thing more important to the public than hygiene, or cleanliness of the mouth."

Another authority declares that decay and infection of the teeth is on the increase, and states that older practitioners who have attended three generations tell us they have seen grandparents go to the grave with sound teeth, while the grandchildren, at the age of 7, have mouths that have gone to rack and ruin. It is obvious, therefore, that bad teeth are not heredi-

*Broadcast over Station WEEI under the auspices of the New England Dental Society.

tary, but are a product of our civilization, its diet, its hurry and its neglect.

Proper diet can practically prevent decay. One authority says what we eat has an effect on the teeth before we are born; that children unborn are robbers, drawing on their mothers for everything they need, and therefore incorrect diet at this period is likely to punish the mother more than the child. If there is too little calcium in her diet, and this is usually the case, her teeth will need special attention soon after the child is born. If the deficiency of calcium is extreme, and it is in the majority of cases, the child's teeth also will suffer, later.

It is an established fact today that the discovery of dental ills can prevent ills in many other parts of the body. The first symptoms of a systemic disease are often detected in the condition of the teeth or gums. Scarlet fever and measles can be detected in the mouth twenty-four hours before they are apparent elsewhere.

Neglect of simple decay eventually results in death of the nerve in the tooth; abscesses form at the tooth root, and we have a focus of infection.

What is focal infection? The dictionary tells us that "focal" means "pertaining to, or placed at a spot"; in other words, focused. To infect means to contaminate, to taint, to communicate a disease, or to cause health to turn into sickness. Selecting our two best definitions, we arrive at the conclusion that "focal infection" means to take a disease which is concentrated at one spot in the body and spread it broadcast throughout the human system, thereby causing sickness instead of health.

Under normal conditions, the body, and especially the mouth, contains germs. When the individual is healthy, the germs remain quiet and do no harm, but when the human system is attacked by a concentration of infection and poisonous germs are constantly fed into the blood, the body is too weak to fight these invading germs, and sickness and disease follow.

There are two kinds of infection: by direct exposure and contact, resulting in such diseases as diphtheria, scarlet fever and pneumonia; and from the formation of pus found in abscesses of the teeth, in diseased tonsils, or in such diseases as trench mouth and pyorrhea. When tooth decay has progressed so far as to kill the nerve, abscesses generally follow.

Two kinds of abscesses may result: acute and chronic or blind. An acute abscess makes its presence known by pain, redness and swelling of the gums, and at one stage is commonly known as an ulceration. In this case, the abscess must be drained, and often the tooth must be extracted to remove the infection.

The blind abscess, unlike the acute, does not make its presence known by pain, swelling and discomfort, but is hidden under the gum line, out of sight, like a thief in the night, doing its deadly work by injecting poison into the circulation and thus possibly distributing its germs to any part of the body. Picture if you will a sponge soaked in poison, and let it represent this blind abscess at the root of a tooth. Picture also the blood, in contact with this sponge a great many times a day in passing through the arteries and veins of the human system. Then remember that these germs in the abscess, which the blood stream is carrying to all parts of the body, all have a hunting ground for which they are seeking and when they find this spot in the body, they stop—their search has ended.

Take, for instance, the specific germ in this abscess that causes rheumatism. Let us follow it from its start in the mouth at the end of a diseased tooth root, bathing

in the circulating blood and finally picked up by the blood stream and carried on its long journey. On it goes through the system, past the lungs, past every organ in the body until it comes to the joints. At the first joint, it stops. It has an affinity for joints and nothing else. Soon, many more germs of the same character arrive in the same way, and, in time, the joints will become inflamed and then rheumatism has started. And, in the same fashion, many other germs from these tooth root abscesses have their own respective hunting grounds, and attack the heart, kidneys or other organs.

Other sources of infection in the mouth are pyorrhea pockets, trench mouth and abscesses that are draining in the mouth as well as the blood. These germs have an additional mode of attack on the blood stream, since, when we chew our food, these germs are mixed well with it and thus carried into the stomach. The blood gets its food to nourish the body from two different sources. First, the air we breathe into our lungs contains oxygen which is taken up by the blood in the lungs. Secondly, from the digestive tract, the blood gets its food, and, in so doing, picks up any germs that may be present.

The rapidity with which an individual succumbs to disease and infection depends a great deal on his or her physical condition. A healthy person throws off disease, so to speak. In other words, healthy persons may have bad teeth with pus germs present, but because of their strong constitutions, they have built up an immunity. I mean by this that they have developed enough good germs to combat disease so that the body can fight off the enemy germs, which, in this case, are the pus germs of the abscess. This war is going on constantly, but as long as the good germs keep the upper hand, sickness will not result.

This situation may be of no concern as long as the good and bad germs are evenly matched, but as soon as the enemy germs get help from reinforcements, which may come from an accident or some physical or mental disease, the enemy germs overcome the good ones, and we develop some such infection as heart trouble, kidney trouble, eye trouble, headaches, indigestion or rheumatism.

From this one phase of general infection through dental channels, it is self evident that the dentist of today, more than ever before, must be a mouth physician, and, by the same token a poor dentist may do more harm than good.

In order to safeguard the function of the teeth, dental inspection, at least twice a year should be supplemented by a full mouth examination by a competent dentist, for only thus will the start of infection and decay of the teeth be detected at an early stage and their progress checked.

Organized dentistry, consisting of the local state societies, and various other professional groups, throughout the country, with their teaching clinics and demonstrations of the latest methods in theory and practice, tends to act as an inspiration and stimulus for its members. The dental practitioner, as a result, strives to give to his patients the benefit of knowledge gained at such conventions and this in turn tends to promote better public health service.

Place yourself in the hands of a skilled operator to avoid any of the many pitfalls awaiting you from neglect of a "perfect 32." Let your family dentist decide.

CURRENT LITERATURE

EXTRACTS AND ABSTRACTS

Concealed Cancer of Tongue: According to MacFee (*Ann. Surg.*, February, 1931; abstr. *J. A. M. A.*) there are two clinical types of cancer of the tongue which may be called concealed. There is the type which conforms to the classic descriptions of cancer but which escapes detection because of its situation. Cancers of this kind are located far back on the tongue, usually in its pharyngeal portion. Favorite sites are those at which there is angulation of the lingual mucous membrane as it merges into the mucosa of adjacent structures, as at the pharyngeal tonsil or of the tonsillar sinus, at the lingual attachment of the glossopalatine arch, in the valleculae, or at the glosso-epiglottic fold. The other clinical type of concealed cancer escapes detection because it is almost completely buried in the substance of the tongue. This type is nearly always in the posterior half or two-thirds of the tongue and is found most often on the inferior surface of the oral portion of the tongue, where its mucous membrane reflects onto the floor of the mouth. It differs strikingly from the usual conception of lingual cancer. Cancer of the tongue is most often described as a foul, irregular ulcer, with uneven floor and with rolled-out, hardened edges. On the contrary, the external ulcer of the infiltrating type of concealed cancer may be small or, indeed, missing, whereas the tumor mass may be large and deeply invading. There is usually a slight dimple or pucker in the mucous membrane over the most superficial part of the tumor. Here, there may be a slight loss of epithelium or it may be intact. Often there is a slight pallor of the surrounding mucous membrane. Just why there should be such deep invasion with so little external ulceration is not apparent. Histologically, the tumor is squamous celled and not of adenomatous origin. The form of cancer may involve a large part of the tongue before it is discovered by either the patient or his physician. The three symptoms of pain in and about the ear, motor disturbances and painless sensory disturbances of the tongue are to be emphasized as among the earliest and therefore the most important symptoms of cancer of the tongue. Salivation, pain in the tongue itself, fetor, and all of the textbook symptoms eventually appear, but by the time they are present the condition is usually hopeless. The signs of concealed cancer of the tongue are often overlooked unless cancer is suspected. Hints of its presence, however, may be derived from the following: When the patient protrudes the tongue far out there is a tendency for it to deviate slightly toward the side of the lesion. This is due in part to replacement of lingual muscle by tumor tissue and partly to terminal motor nerve involvement, which produces an incomplete paralysis of the affected side of the tongue. Often a slight dimpling, furrowing, flattening or other evidence of retraction of the surface mucous membrane may be seen. Occasionally it is possible to detect a slight defect in the patient's speech. This results from mechanical disability of the tongue. Inspection may reveal a minute ulcer at the most superficial point of an infiltrating cancer. Lesions of the pharyngeal portion of the tongue may be revealed by the laryngeal mirror. Palpation properly done will nearly always reveal an area of induration.

Explosions Occurring During Use of Ethylene: Johnston and Cabot (*Arch. Surg.*, February, 1931; abstr. *J. A. M. A.*) believe that the following recommendations will provide a safe and workable system for the prevention of explosions during the use of ethylene-oxygen or other anesthetic mixtures. General measures: 1. Enforcement of strict regulations prohibiting the use of electrical equipment or any obvious source of heat in the vicinity of the anesthetic equipment. 2. Adherence to the suggestions of McKesson for the technic of ethylene administration. Measures to prevent explosions due to static spark outside the

machine. 1. Thin sheet metal (copper, brass or rustless steel) flooring forming a continuous pathway from the anesthetic rooms across the hall into the operating rooms, where it should cover most of the floor space. Chains electrically connected to and suspended from the anesthetic machines and other movable equipment so as to drag on the metal floor. 3. Inspection of breathing tubes to make certain that the spiral conductor embedded therein projects into the lumen of the tube and that it is electrically joined to the metal pieces at the extremities of the hose. The breathing tubes should be covered by a coarse network of copper wire, which should likewise be soldered to its metal ends. Metal plates connected electrically to the metal floor should be placed on the outside of all doors leading into the operating rooms in such a way that one cannot open the door without touching the metal plate. 4. Connection between the patient and the metal frame of the operating table by means of a chain ending in a suitable piece of metal, which must rest against his skin. 5. Holes cut in the rubber mat on the carriage of the machines and insulating paint removed from the metal platform at these points, so that the tanks will be positively grounded to the frame of the apparatus. 6. Installation of a device, such as the one used by Salzer, to prevent the exhaust gases from being poured out into the operating rooms. Measures to prevent explosions due to static spark within the machines: 1. Trial of a small quantity of a radioactive substance within the rubber rebreathing bag; if the foregoing method does not absolutely prevent charges from accumulating on the bag, replacement of the bag with a manometric device described. 2. Inspection of the check valve admitting gases into the mixing chamber weekly to make sure that the valve and the valve seat are clean and dry. Tests: During the cold months of the year, an occasional test with a gold leaf electroscope to be assured that the system is actually eliminating the danger from static electricity.

Nupercain: A new anesthetic, nupercain, which has been used in Europe under the name of percain and praised because of persistence of the anesthesia for from six to eight hours, is treated in a preliminary report by Edward L. Keyes and Allister M. McLellan (*Am. J. Surg.*, July, 1930). Cases illustrating its use in caudal, spinal and local anesthesia are reported. One of the authors had three teeth extracted under nupercain (1:1,000 solution) and reports anesthesia perfect, and with no resultant pain except soreness on one side the following morning. The authors regard nupercain, in about ten times the dilution of cocain, an excellent local anesthetic. The solution must be kept slightly acid, and it may be boiled. It may be used in conjunction with epinephrin or with procain. While the minimal reported lethal dose for an adult is 90 mg., individuals have survived the administration of 750 and 1,500 mg. Several surgeons have recognized 200 c.c. of a 1:1,000 solution as the maximum dose for local anesthesia; the authors' maximum has been 60 c.c. They regard nupercain as preferable to procain because personal susceptibility to nupercain is negligible as compared to that associated with procain, and the resultant anesthesia always lasts ninety minutes and usually as long as six to eight hours.

Oath Required of Candidates for Membership in the American College of Physicians: . . . I pledge myself . . . to consider ever primary to my own, the welfare of patients dependent upon my professional knowledge and skill; ever to respect the interests and reputations of my colleagues; as occasion requires, to supplement my own judgment with the wisdom and counsel of competent medical specialists; to render my assistance willingly to my colleagues; to extend freely my professional aid to the unfortunate, the poor and the needy; to advance steadily in knowledge by the reading of authoritative medical literature, by attendance at important gatherings of medical men, by postgraduate instruction from men of eminence and position, and by the free interchange of experience and opinion with my associates. Further, I promise, in so far as in me lies, to shun the public press or public gatherings of laymen where my attitude might be regarded as seeking self-advancement; to avoid selfishness and commercialism in my professional practice; to influence patients to appreciate their financial responsibilities to their medical advisers; to adjust my compensation to the circumstances of my patients and to make such charges commensurate with the services rendered and to avoid discrediting my profession by seeking unwarranted compensation . . .

Mouth Conditions Causing Ocular Infections: That teeth and their adjacent structures are the principal sources of infection in eye conditions is the belief of John J. Con-

nelly (*J. Indiana M. A.*, April, 1931). Elimination of other possible foci of infection in eye conditions has not been followed by encouraging results. To Wilmer's list of mouth conditions that may be responsible for ocular infection, i.e., apical abscess, pyorrhea alveolaris, septic broken roots, maxillary or mandibular infection remaining after extraction of diseased teeth, impacted, infected teeth, pulp stones and degenerating pulp of an anomalous extra root and a nutritive disturbance following traumatism, the author adds unerupted teeth, and he states that apical or periapical abscess is probably responsible for most pathologic eye conditions. He does not entirely agree with MacCallan's list of ocular diseases that may be cured or improved by the elimination of a septic focus (i.e., increased lachrymation, blepharitis, tarsal cysts, chronic conjunctivitis, phlyctenular conjunctivitis, episcleritis, corneal ulcer, dendritic ulcer of the cornea, dacryocystitis, iritis and cyclitis) but believes that we may be fairly positive that iritis, uveitis, cyclitis, episcleritis and corneal ulcer should be considered. He quotes MacCallan as denying that cataract or any opacity of the crystalline lens is affected by dental sepsis, but states that changes in the vitreous, hyperemia of the macula, pigmentary changes and definite degeneration of the retina at the macula, chroiditis and progressive myopia are associated with focal sepsis. Benedict recognized the following methods of transfer of infection to the eye: (1) directly through the bone, the tooth socket becoming the seat of an infection that destroys the bone of the upper jaw, through that directly affecting the orbital walls, finally producing cellulitis or retrobulbar neuritis; (2) direct extention of the process along the periosteum to the malar bone, invading the orbit and giving rise to the same processes, and (3) transfer of organisms from the focus of the tooth to the eye by the blood stream. The author decries the feeling of security against focal infection in the edentulous, reporting three cases in which residual infection in sockets or around roots remaining in the jaws was responsible for ocular conditions.

Dentistry as a Career: The annual incomes of 168 dentists in a recent study average $4,148. Of these, nineteen one year out of college averaged $1,934; seventy-four two years out averaged $2,908; fifty-four five years out averaged $5,652; and fourteen ten years out averaged $6,714. While these figures are inadequate, at least they provide some indication of what returns a new graduate may expect. In a typical midwestern rural community with thirteen dentists, the net professional income of five ranged from $500 to $1,499; five others from $2,500 to $3,499; two from $3,500 to $4,499, and one over $4,500; their investment in equipment for ten years ranged from $150 to $3,500. In the United States, there are over 67,000 dentists serving about 113,000,000 people, or about one dentist to every 1,700 persons; for comparison, there are 2.3 times as many physicians, or one to every 767 persons. In a few states, the ratio is one dentist to every 4,000 persons as in Alabama, Arkansas, Mississippi and South Carolina; and one to 3,000 in Arizona, Georgia, Kentucky, New Mexico, North Carolina, Texas and Virginia. Among the negroes, there is only one colored dentist to every 8,500 persons. In 1928, the thirty-eight dental schools registered 9,010 men and 110 women and graduated 2,503 students. There is a tendency for dentists to settle in or near the cities, leaving large territories with inadequate dental service. The Southern states particularly need dentists.—Walter J. Greenleaf, in Circular 33, the United States Department of the Interior, Office of Education.*

*Circular 33, discussing dentistry as a career, specialties, compensation, census figures, women in dentistry, dental hygienists, progress in dentistry, the Dental Education Council of America, state requirements for dentists, state board examinations, the dental schools, time required for training, courses of study, degrees, expenses, with estimated student budget, and tabulation of dental schools (1931), giving rating, required years, annual expense, enrollments (1928), graduates (1928) and percentages of failures on state board examinations (1928 and period of 1910-1928) can be had on application to the Library Bureau, American Dental Association, 212 E. Superior St., Chicago, Ill.

MISCELLANY

BOOK REVIEW

A Speech for Every Occasion—By A. C. Edgerton, LL.M.; 427 pages; price, $2.00. Published by Noble and Noble, New York.

In the numerous speeches outlined in this book, there is almost certain to be one to fit any special occasion. It has required an immense amount of work to gather into a single volume so many addresses on such a variety of themes.

Speech-making to be effective is a rather difficult art, and the man or woman who essays to entertain an audience whether at a dinner or on a more formal occasion should aim to make adequate preparation in advance. With those rare individuals who are able to meet an emergency and make an appropriate speech on the spur of the moment, there is usually in the background a long period of preparation or at least of practice. Inspired speaking is unusual, and frequently the speech that sounds the most inspirational is the one that has behind it the greatest wealth of experience and study. This book should be a help in the way of suggestion to those who are frequently called on to make speeches.

FRAUDULENT AND MISLEADING ADVERTISING*

By N. O. TAYLOR,† Ph.D., Washington, D. C.

Early in March, a copy of the advertising circular shown in the accompanying illustration was forwarded to the Bureau of Standards with a request for information as to the validity of the claims set forth.

The advertisement was so worded as to imply that the advertiser was possessed of confidential information from the Bureau of Standards which could be secured on payment of $5. An investigation was made of the proposition as outlined, and the resulting information is set forth below.

The circular, which was received through the mail the latter part of February and subsequently sent on for investigation, is designated to utilize the name of the Bureau of Standards in an attempt to victimize the dentist. The cover page of the circular is reproduced herewith.

Cover page of circular.

The distributor of the circular says:

"This idea has not been released by the Bureau of Standards—but I have it—and I am going to pass it along to you. So you will be a few steps ahead of the crowd."

He follows this statement with some misleading and inaccurate statements as to what

*A Report from the Bureau of Standards Committee of the Research Commission.

†Research Associate for the American Dental Association.

the material he proposes to supply will do. The price quoted is $5 for enough material for 100 inlays, with a promise of a rate of about 1 cent per inlay for future orders.

An order for the material brought 100 small asbestos strips for use as crucible liners with some instructions as to its use and a further indication of the confidential source of information. It may be pointed out here that these circulars purporting to carry confidential information were being mailed to the dental profession in an attempt to charge for such information in the early part of 1931, while we find that the technic involving the use of an asbestos liner for casting rings was given to the profession at the Denver meeting in July, 1930, and was published in THE JOURNAL, December, 1930, page 2275.

The 100 asbestos strips were sold for $5. The actual value of the strips in quality lots is certainly below 10 cents, as the total weight of these strips was approximately one-half pound.

From these facts, it seems that the dental profession should be appraised of the following:

1. The results of the cooperative research on dental materials at the National Bureau of Standards are released only in the officially approved published reports.

2. Committees from the dental profession assisting in this research program are at times given laboratory data which are considered confidential until such data are included in the published report.

3. Any inference that confidential data from the Bureau of Standards are available and for sale to the profession is obviously a direct misstatement and false.

4. Circulars of this type constitute an attempt to obtain money under false pretenses and should be given no consideration whatever.

DENTAL HYGIENE IN HAITI

Three years ago, the dental school was reorganized and the question of establishing dental inspection for the public schools was undertaken by the Dental Department of the Medical School in Port-au-Prince, Haiti. This was not an easy task, especially in the face of the many difficulties to be surmounted. In Haiti, this work is under the Department of Hygiene.

There is as yet no adequate legislation regarding schools except that having to do with medical inspection. There are more than 14,000 children in the private and public schools who for the most part have never had any dental inspection. There have been no clinics for school children, and therefore defects received no particular attention.

The reorganized dental school opened its clinic with a plan for the relief of pain, filling and extracting teeth, etc. Nearly all the children in Port-au-Prince have been examined, with the result that children are becoming cleaner and mouth hygiene is improved. Recently, the school inaugurated a dental hygiene day, which was a great success. More than 4,000 toothbrushes and the same number of tubes of tooth paste were distributed.

Notwithstanding the very great existing needs, the staff of the dental school is not discouraged and is hoping soon for some unlooked for aid. Only in this way will it be possible to accomplish lasting advancement in dental work. It is hoped to establish dental clinics in the rural districts with the aid of a dental ambulance.

NEWS

Dr. Gillett Recipient of Jarvie Medal: A banquet was recently given Henry Webster Gillett, New York City, by the Dental Society of the State of New York on the occasion of the presentation to him of the William Jarvie Fellowship medal for 1931. Alfred Walker presided, and Robert Todd Oliver and William J. Gies were speakers. W. D. Tracy presented the medal, which is given for outstanding contributions to the advancement of the profession of dentistry.

Mr. Eastman Offers Clinic to Belgium: Mr. George Eastman will probably add a fifth dental dispensary to the list of foreign clinics made possible by his philanthropy. The City of Brussels is to receive $1,000,000, provided it will guaranty a similar amount toward the project. The work of the clinic will be devoted principally to the indigent children of the city. London, Rome, Stockholm and Paris have received $1,000,000 each for dental dispensaries. These clinics are modeled after the Rochester Dental Dispensary, Rochester, N. Y., of which Mr. Eastman was the donor.

Resolution Passed in Ohio Regarding Qualifications of Candidates for License: Following is a resolution adopted by the Ohio State Dental Board, June 27, 1931: "Resolved that the Ohio State Dental Board will not admit to examination any applicant who has

graduated from a dental school of a lower standard of professional education than that maintained by the dental schools now in existence in Ohio; excepting those persons who have, at the time of the passage of this resolution, matriculated in a professional school which has heretofore been defined by this board as a 'reputable dental college.' Be it further resolved that this resolution shall in no way affect dentists who have practiced outside the state of Ohio previous to 1931. Be it further resolved that the secretary of this board shall immediately send by registered mail an authenticated copy of this resolution to the deans of all the dental schools in the United States and Canada." The resolution is signed by R. C. Harkrader, president of the board, S. F. Ridings, H. Van Valkenburg, A. T. Wiley and M. H. Jones, secretary of the board.

University of Oklahoma Extension Division Lectures on Dental Economics: R. H. Miller, St. Louis, Mo., has accepted a permanent assignment to the faculty of the University of Oklahoma Extension Division for a series of lectures in dental economics. These lectures are sponsored by the University of Oklahoma for the dental profession of Oklahoma. Dr. Miller has already made two trips to the state of Oklahoma and has given a series of lectures in Oklahoma City, Tulsa, Ponca City and Hobart. The lectures of Dr. Miller are supplementing, and covering a practical phase of, a course in dental economics now being sponsored by the University Extension Division of Oklahoma jointly with the state dental society. The program includes an office to office survey, by a survey expert who visits each dentist's office for an all day instructional program to the dentist and his assistant. The program covers modern business methods that may be used in the professional office. The program opened, February 1. To date, more than 100 dental offices have been surveyed. There are a total of 665 dentists in Oklahoma. The state has no state dental college, nor are there other dental colleges located within the state. The dental profession of the state recently secured an appropriation to be administered through the University of Oklahoma for higher dental education, which will include the course in dental economics. Another phase of the dental economics course will include practical lectures and instruction from various departments of the university on money and banking, investments, salesmanship, credits and collections, public finance, legal dentistry, public speaking and psychology. As far as is known, this is the first course of this type offered by any university or college in America for the dental profession already in practice. Other states contemplating the introduction of a course of this type are Wisconsin, Kansas, California and Oregon.

Death of Dr. Junkerman: G. S. Junkerman, dean of the Cincinnati College of Dental Surgery, died May 22, at his home in Avondale, Cincinnati, after an illness of eighteen months. Dr. Junkerman was born Feb. 14, 1859, in Cincinnati, the son of Mr. and Mrs. G. F. Junkerman. He received his education in the Cincinnati schools, graduating from Woodward High School in 1879. He graduated from the Ohio College of Dental Surgery in 1881 and Miami Medical College in 1895. He received the A. M. degree from Ohio University, Athens, Ohio, in 1905. He founded the Cincinnati College of Dental Surgery in 1893. He was a member of the Cincinnati Club, Cincinnati Automobile Club, Cincinnati Dental Society and the Academy of Medicine. He is survived by his widow, Mary B. Junkerman, and two children, Mrs. Joseph B. Matre, Washington, D. C., and Dr. Hall L. Junkerman, Cincinnati.

Connecticut State Officers: Following are the officers of the Connecticut State Dental Association: president, Stanley E. Armstrong, New Haven; first vice president, J. Francis Keeley, Bridgeport; second vice president, J. Otis Miner, New London; secretary-treasurer, C. W. Vivian, New Britain.

Recipients of Certificates from Orthodontia Board: Oren A. Oliver, secretary of the American Board of Orthodontia, submits the following list of orthodontists who have met the requirements of the board and have been issued certificates of qualification: E. B. Arnold, Houston, Texas; E. Santley Butler, New York City; Robert Dunn, San Francisco, Calif.; Joseph D. Eby, New York City; Walter H. Ellis, Buffalo, N. Y.; Adelbert Fernald, Boston, Mass.; Henry C. Ferris, New York City; D. Willard Flint, Pittsburgh, Pa.; George W. Grieve, Toronto, Canada; Russell E. Irish, Pittsburgh, Pa.; Earl G. Jones, Columbus, Ohio; Harry C. Metz, Pittsburgh, Pa.; Stephen A. Moore, London, Canada; John R. McCoy, Los Angeles, Calif.; H. C. Pollock, St. Louis, Mo.; Homer B. Robison, Hutchinson, Kas.; Walter S. Sargent, To-

ledo, Ohio; Paul G. Spencer, Waco, Texas; Ralph Waldron, Newark, N. J.; Raymond L. Webster, Providence, R. I.; Percy Norman Williams, Tucson, Ariz.

Rockaway Dentists Form Society: The dentists of the Rockaways (L. I.) and branch villages held their first meeting, June 25, and organized the Rockaway Dental Society. The following were elected officers: president, J. Ben Goldsmith, Manhattan and Lawrence; vice president, Max L. Kurtz, Far Rockaway; secretary, Harry C. Weiner, Rockaway Park; treasurer, William Walling, Woodmere.

Dr. Damron Honored: George H. Damron, of Arcola, Ill., was recently honored by a banquet given by the Eastern Illinois Dental Society in recognition of his fifty years of service in the dental profession. About eighty of his colleagues and other friends were in attendance.

Duty Assessment Cut on Dental Apparatus: According to an announcement published June 19, Judge Sullivan of the Customs Court had just handed down a decision, under the Tariff Act of 1930, fixing the classification of merchandise described as dental apparatus, including articulators, glass dishes, bottles, jars, boxes and glasses. All of this merchandise, imported by the Kimball Dental Manufacturing Co., of Chicago, was assessed at 85 per cent ad valorem, under paragraph 218, Act of 1930. The duty on some of the items involved is lowered. The first item, consisting of articulators, is composed entirely of metals, and is used for mounting teeth and making plates. The court fixes duty at 35 per cent ad valorem under paragraph 359 of the Act of 1930. Other items referred to as exhibits 4, 5 and 6, are held dutiable at the appropriate rate, according to capacity, under paragraph 217 of the 1930 Act. Exhibit 5 was invoiced as "glass boxes," while exhibit 6 is a similar article to exhibit 5, but of blue glass and much larger. As to the other items, the collector's assessment at 85 per cent is permitted to stand. (Protest No. 467466-G-78881.)

X-Ray Tube of Rubber, Paper and Aluminum: According to a report published recently, announcement was made at a meeting of the American Association for the Advancement of Science, June 18, at Pasadena, Calif., that Profs. F. Lange and A. Brasch, of the University of Berlin, have constructed an x-ray tube of rubber, paper, aluminum and crankcase oil, 3 feet long, more powerful than any x-ray tube conceived as feasible and also more powerful than all the radium in the world. Alexander Goetz, of Pasadena, reported completion of the tube, in the absence of the two scientists. Several of the foremost authorities on x-ray tubes were in attendance at the meeting.

Deaths

Hughes, David J., Harvey, Ill.; Northwestern University Dental School, 1901; died April 30; aged 60.

Keegan, James M., Denver, Colo.; University of Denver College of Dentistry, 1917; died, April 2; aged 36.

Koniuszewski, W. N., Chicago, Ill.; Northwestern University Dental School, 1915; died, May 20; aged 44.

Rosen, Joseph G., Chicago, Ill.; Chicago College of Dental Surgery, 1911; died May 12.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association, Memphis, Tenn., Oct. 19-23, 1931.

American Academy of Periodontology, Memphis, Tenn., Oct. 15-17, 1931.

American Dental Hygienists' Association, Memphis, Tenn., Oct. 19-23, 1931.

American Dental Assistants Association, Memphis, Tenn., Oct. 19-23, 1931.

American Full Denture Society, Memphis, Tenn., Oct. 16-17, 1931.

American Society of Oral Surgeons and Exodontists, Memphis, Tenn., Oct. 16-17, 1931.

International Dental Congress, Paris, France, Aug. 3-8, 1931.

International Stomatologic Congress, Budapest, Sept. 2-7, 1931.

Chicago Dental Society, January 18-21.

*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

Committee on Costs of Medical Care, Washington, D. C., September 17-24.

Greater New York, New York City, November 30-December 4.

Montreal Dental Club, October 15-17.

National Association of Dental Examiners, Memphis, Tenn., October 17.

New England Dental Society, Boston, Mass., October 8-10.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

Southern Society of Orthodontists, Cincinnati, Ohio, December 1-3.

Southwestern Dental Society, Albuquerque, N. M., October 13-15.

St. Louis (Mo.) Dental Society, December 7-9.

STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

October

New Mexico, at Albuquerque (13-15).

December

Ohio, at Cincinnati (1-3).

May

New York, at Albany (11-13).

GREATER NEW YORK DECEMBER MEETING

The seventh Greater New York December Meeting will be held at the Hotel Pennsylvania, New York City, November 30-December 4. This meeting is held under the auspices of the First and Second District Dental Societies of the State of New York. Plans for this meeting provide for essays and a series of clinics, together with a group of topical discussions. The Chicago Dental Society has accepted an invitation to furnish essayists and clinicians for the meeting. Plans are being formulated for a joint meeting of the medical societies of the five boroughs of Greater New York and the first and second district dental societies.

An exhibit by dental manufacturers will continue throughout the meeting.

JOHN T. HANKS, *Chairman.*

DENTAL SOCIETY OF THE STATE OF NEW YORK

The Dental Society of the State of New York will hold its sixty-fourth annual meeting, May 11-13, at Hotel Ten Eyck, Albany. An invitation is extended to all members of state societies, Canadian societies and other ethical dentists. H. J. Burkhart, 800 East Main Street, Rochester, is chairman of the program committee; E. W. Briggs, 1116 Madison Avenue, Albany, chairman of the exhibits committee, and E. Hurley, 80 Fourth Street, Troy, chairman of the clinics committee. For further information address

A. P. BURKHART, *Secretary,*
57 E. Genesee St.,
Auburn.

ST. LOUIS DENTAL SOCIETY

The St. Louis Dental Society will observe its seventy-fifth anniversary by a meeting at Hotel Jefferson in St. Louis, December 7-9. Smaller societies in and around St. Louis are invited to attend and facilities will be provided for a joint meeting. A manufacturers exhibit will be held simultaneously with this meeting.

RUSSELL C. WHEELER, *Chairman*
Publicity Committee,
University Club Bldg.

CHICAGO DENTAL SOCIETY MIDWINTER MEETING

The 1932 midwinter meeting of the Chicago Dental Society is to be held at the Stevens Hotel, Chicago, January 18-21. All members of the American Dental Association and members of recognized foreign dental organizations are invited.

HOWARD C. MILLER, *Secretary,*
55 E. Washington St.

OHIO STATE DENTAL SOCIETY SIXTY-SIXTH ANNUAL MEETING

The sixty-sixth annual meeting of the Ohio State Dental Society will be held at the Netherland Plaza Hotel, Cincinnati, December 1-3. The Southern Society of Orthodontists will hold its meeting jointly with the Ohio State Society. All members of the American Dental Association are invited to attend.

EDWARD C. MILLS, *Secretary,*
255 East Broad St.,
Columbus.

DELTA SIGMA DELTA FRATERNITY

The forty-seventh annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in Memphis, Tenn., October 19. The first session will be held at 9:30 a. m., followed by a luncheon, and immediately thereafter by the afternoon session. Upon presentation of candidates by auxiliary chapters, the initiatory exercises will be held in the afternoon after the conclusion of the business meeting. All business meetings and the initiatory exercises will be held at the Hotel Gayoso, where the annual banquet will be held at 6:00 p. m. When registering for the banquet, it will be necessary to present membership card to the committee having that matter in charge. Those expecting to attend should get in touch with Brother Justin D. Towner, chairman of Committee on Local Arrangements, Exchange Building, Memphis. By Order of the Supreme Council,

L. J. MITCHELL, *Supreme Grand Master.*
R. HAMILL D. SWING, *Supreme Scribe,*
Elrae Bldg.,
Philadelphia, Pa.

PSI OMEGA FRATERNITY NATIONAL ALUMNI CHAPTER

The headquarters of the National Alumni Chapter of the Psi Omega Fraternity will be the Claridge Hotel, Memphis, Tenn., where the annual banquet will be held Monday, October 19, at 6:30 p.m. The banquet will terminate in time for the members to attend the dance to be given by the American Dental Association at 10:00 p.m. The executive meeting of the chapter, together with initiations, will occur at headquarters, Tuesday, October 20, at 2:00 p.m.

W. F. SWANSON, *Grand Master,*
5326 Pocusset St., Pittsburgh, Pa.
J. R. MITCHELL, *Secretary,*
Candler Bldg., Atlanta, Ga.

XI PSI PHI FRATERNITY

The Supreme Chapter of Xi Psi Phi Fraternity will hold its biennial Supreme Chapter Meeting at Memphis, Tenn., October 16-17, at the Elk's Hotel. The opening session will be held Friday, October 16, 9:00 a.m.; Supreme Chapter banquet, Monday, October 19, at 6:30 p.m., at the Elk's Hotel. All members of the fraternity are invited to be present.

G. A. GRUBB, *Supreme President,*
Lincoln, Nebr.

THE AMERICAN ACADEMY OF PERIODONTOLOGY

The Eighteenth Annual Meeting of the American Academy of Periodontology will convene at the Hotel Gayoso, Memphis, Tenn., October 15-17.

CLAYTON H. GRACEY, *Secretary,*
Fisher Bldg., Detroit, Mich.

AMERICAN FULL DENTURE SOCIETY

The American Full Denture Society will meet at the Claridge Hotel, Memphis, Tenn., October 16-17.

H. L. HARRIS, *Secretary,*
Medical Arts Bldg.,
Minneapolis, Minn.

MONTREAL DENTAL CLUB FALL CLINIC

The seventh annual Fall Clinic of the Montreal Dental Club will be held at the Windsor Hotel, Montreal, October 15-17. An invitation is extended to all ethical dentists; fee, $15, including luncheons. For information regarding space, address K. C. Berwick, 1410 Guy St., Montreal.

E. C. BURBANK, *Chairman of Publicity,*
1008 Medical Arts Bldg.

AMERICAN CONGRESS OF PHYSICAL THERAPY

The tenth annual session of the American Congress of Physical Therapy will be held at the Hotel Fontanelle, Omaha, Nebr., October 5-8. For preliminary program and other information, address the American Congress of Physical Therapy, 30 North Michigan Ave., Chicago, Ill.

AMERICAN DENTAL ASSOCIATION

Memphis, Tennessee. October 19-23, 1931.

HOTEL RESERVATION

In securing hotel reservations for the 1931 Session, consult the hotel rate-sheet and fill out the blank application below. Mail immediately to the hotel you wish to patronize. The hotel will then advise you of the reservation which has been made for you.

As your first choice may not be available, kindly indicate a second and a third choice. If none of these are available, the hotel manager will mail your application to the Chairman of Halls and Hotels Committee, who will make a reservation for you in as favorable a hotel as possible.

Please remember that a reservation constitutes a contract with the hotel to provide you with the accommodations you desire. If you find it impossible to carry out your part of the contract, namely, to occupy the room at the time agreed on, please write or wire the hotel, releasing it, in order that your room may be available for other members.

MAIL THIS APPLICATION DIRECT TO THE HOTEL

HOTEL RESERVATION

AMERICAN DENTAL ASSOCIATION, MEMPHIS, TENNESSEE, OCTOBER 19-23, 1931

.....Hotel. 1931

Memphis, Tenn.

Please reserve sleeping room accommodations as noted below:

.....Room(s) with bath for.....people. Rate desired $..... (per day)

.....Room(s) without bath for.....people. Rate desired $..... (per day)

Second choice hotel.....

Third choice hotel.....

ROOMS TO BE OCCUPIED BY:	ADDRESS IN FULL
Applicant.....	.....
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Please confirm this reservation to applicant. I further agree to notify the hotel at once in the event I am unable to use this reservation.

IMPORTANT TO HOTEL MANAGER: In the event you cannot accept this reservation, please forward this application at once to Dr. E. F. Simpson, Chairman Halls and Hotels Committee, 735 Sterick Bldg., Memphis, Tenn., who will attend to the assignment of this reservation.

HOTEL	Single Room with Bath	Double Room with Bath	Single Room without Bath	Double Room without Bath
ADLER 73 Linden Ave.	$2.00 & up	$3.50 & up 5.00 & up (twin beds)	$1.50 & up	$2.50 & up
AMBASSADOR 347 S. Main	2.00	3.50	1.50	2.50
CATHOLIC CLUB 185 Adams			1.25	2.00
CHICKASAW 99 S. Main			1.00	1.50
CHISCA 270 S. Main	2.00 & up	4.50 & up 5.00 & up (twin beds)	2.00 & up	3.50 & up
CLARIDGE 109 N. Main	3.00 & up	4.50 & up		
DESOTO 154 E. Calhoun			1.25	2.00
ELK'S 69 Jefferson	3.00-3.50	4.00-5.00 5.00-6.00 (twin beds)	2.00-2.50 Con. bath	3.00-4.00 Con. bath
FOREST PARK 855 Union	2.00	2.50	1.00-1.50	1.50-2.00
GAYOSO 139 S. Main	3.00 & up	5.00 & up	2.00 & up	3.00 & up
HERMITAGE APTS. 200 Union	1.50	2.75	1.00	1.75
WM. LEN 110 Monroe Ave.	2.50 & up	4.50 5.00 (twin beds)		
LONGINOTTI S. Main St.			1.00	1.50
PARKVIEW 1914 Poplar	3.50	5.00-6.00		
PEABODY HOTEL 149 Union	3.50 & up	5.50 & up 7.00 & up (twin beds)		
PLAZA 214 Calhoun	2.00	3.00	1.50-2.00	2.50-3.00
POLK APTS. 630 Madison	2.00	2.50-3.00		
PONTOTOC 69 Pontotoc	1.50	2.00	1.00	1.50
TENNESSEE 80 S. Third St.	2.00 & up	3.00 & up		
WINONA 110 E. Calhoun	2.00	3.00	1.00-1.50	2.00-3.00
WALDORF S. Main St.	1.50	2.00	1.00	1.50

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1930-1931

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